Instruction

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Intelligent Field Device Configurator (IFDC)

For Use with I/A Series® Systems
and
PC20 for Use with Windows® Based PCs

invensys
Foxboro®

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Preface

This manual on the Intelligent Field Device Configurators (IFDC/PC20) explains how to install, operate, and troubleshoot the configurator and how to operate, calibrate, configure, and troubleshoot Foxboro® Intelligent Devices using the IFDC/PC20 software package.

Chapters 1, 2, 3, and 4 introduce the IFDC/PC20 and explain how to install IFDC/PC20, how to operate the IFDC/PC20 program, and how to troubleshoot the IFDC/PC20 respectively.

This is followed by appendixes on each Foxboro Intelligent Device. Each appendix shows an example of the device's data screen, gives an explanation of the device's status/diagnostic error messages with recommended actions, explains how to calibrate and configure the device, and shows a sample database report.

Therefore, to use this manual, refer to Chapter 1., "Introduction" to gain an understanding of the IFDC and PC20 capabilities, to Chapter 2., "Installation" for an explanation of how to install IFDC/PC20, and to Chapter 4., "Troubleshooting" for IFDC/PC20 troubleshooting procedures. Refer to Chapter 3., "Operation" and the appropriate appendix for procedures on how to communicate with your specific Foxboro Intelligent Device.

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1. Introduction

Overview

The Foxboro Intelligent Field Device Configurator is a software package providing remote bidirectional communications with the Foxboro and Foxboro Eckardt Intelligent Field Devices. The software is available in two different versions as follows:

- Model PC20, which includes an external modem for use on a user-supplied personal computer
- The Intelligent Field Device Configurator (IFDC), which is a software component of an I/A Series system.

Features of the Intelligent Field Device Configurators include:

- Accurate reranging without recalibration
- Unlimited device database storage on diskette or hard disk
- Full screen device database display
- Enhanced device diagnostic capability
- On-line Help and context-sensitive Help screens
- Direct access to Microsoft® Word and Excel® software (if installed)
- Field-proven FSK communication
- RFI/EMI protection
- Communications that do not affect output
- Remotely set device output to calibrate other devices in the loop
- Capability to reconfigure, copy, and clone databases
- Capability to upload and download device databases
- Capability to print out device databases
- User-configurable measurement data graphical trend display (PC20 only).

Both the PC20 and IFDC are functionally equivalent, but there are a few differences regarding the features and use as shown in Table 1.

Table 1. PC20 and IFDC Feature and Use Differences

Subject	PC20	IFDC
Support for FoxCom™ protocol devices	See "Field Device Restrictions" on page 7.	See "Field Device Restrictions" on page 7.
Support for Foxboro HART™ devices	Yes.	Yes.
Support for non Foxboro HART devices (universal and common practice commands)	Yes.	Yes.

Table 1. PC20 and IFDC Feature and Use Differences (Continued)

Subject	PC20	IFDC
Trending display	Yes.	No - use the I/A Series system trending package.
Modem	External modem attaches to serial port of PC.	Integral in the Intelligent FBM.
Attachment to field device	Clip wires onto leads.	Automatic connection through the Intelligent FBMs (18, 39, 43, 44, 46, 243, 246, 214, 215, 216, 218).

Field Devices Supported

The configurators support the devices shown in Table 2.

Table 2. Devices Supported

Version	Protocol	Devices Supported
PC20	FoxCom	Pressure: 140, 820, 860, and I/A Series system Pressure Temperature: RTT10, RTT20, and TI20 Series Magnetic Flow: IMT10, IMT20, IMT25, IMT25L, and IMT96 Series Mass Flow: CFT10 and CFT15 Series Vortex: 83 Series Electrochemical: 870ITEC, 870ITPH, and 870ITCR Series Buoyancy: 140 Series Intelligent Positioner: SRD991, SRD960, SRD970, and NAF LinkIT
	HART	Pressure: 130, 140, Foxboro I/A Series system Pressure, Invensys I/A Series system Pressure, and Viatran I/A Series system Pressure Temperature: RTT10, RTT20, and TI20 Series Magnetic Flow: IMT25 and IMT25L Series Vortex: 83 Series Buoyancy: 130 and 140 Series Intelligent Positioner: SRD991, SRD960, SRD970, and NAF LinkIT Non Foxboro Devices: (Universal and Common Practice commands only)
	Profibus	Buoyancy: 140 Series (Profibus-PA) Intelligent Positioner: SRD991, SRD960, SRD970, an NAF LinkIT (all Profibus-PA)

Table 2. Devices Supported (Continued)

Version	Protocol	Devices Supported
IFDC	FoxCom	Pressure: 140, 820, 860, and I/A Series system Pressure Temperature: RTT10, RTT20, and TI20 Series Magnetic Flow: IMT10, IMT20, IMT25, IMT25L, and IMT96 Series Mass Flow: CFT10 Series Vortex: 83 Series Electrochemical: 870ITEC, 870ITPH, and 870ITCR Series Buoyancy: 140 Series Intelligent Positioner: SRD991, SRD960, SRD970, and NAF LinkIT Hydrostatic Tank Gauging: HTG (Solaris™ only using ITMW, Intelligent Transmitter Maintenance Workbench)
	HART	Pressure: 130, 140, Foxboro I/A Series system Pressure, Invensys I/A Series system Pressure, and Viatran I/A Series system Pressure Temperature: RTT10, RTT20, and TI20 Series Magnetic Flow: IMT25 and IMT25L Series Vortex: 83 Series Buoyancy: 130 and 140 Series Intelligent Positioner: SRD991, SRD960, SRD970, and NAF LinkIT Non Foxboro Devices: (Universal and Common Practice commands only)

IFDC

The IFDC software package enables you to communicate with Foxboro Intelligent Devices via Workstation Processors (WPs) and Application Workstations (AWs).

The IFDC supports AW/WP51s and AW/WP70s.

All Intelligent Field Devices are connected to the Foxboro Fieldbus through Fieldbus Modules or interface modules. The Foxboro Fieldbus, in turn, is connected to the system through the Control Processor (CP). The CP continually scans the device for its measurement and status data. This data is stored in the CP database. If a device is connected and on-line, the information in the CP always reflects the information in the device.

Figure 1 shows the relationships among processors and field devices.

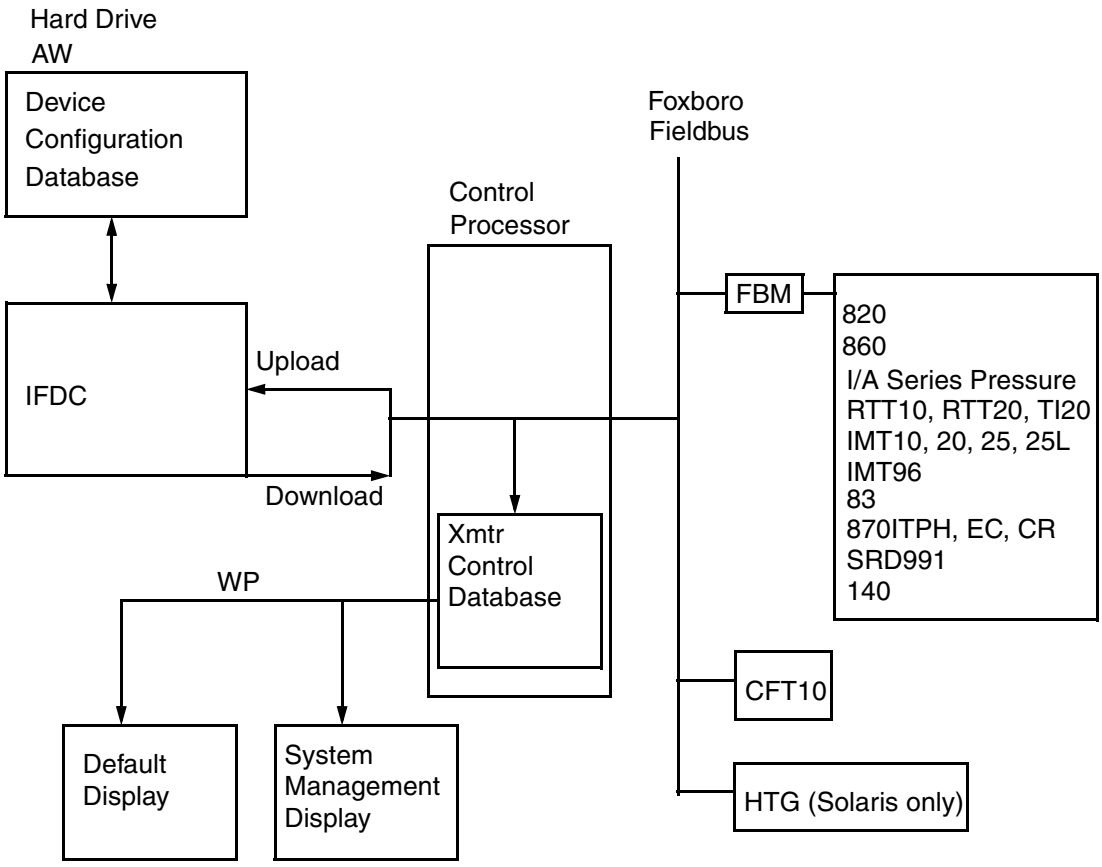


Figure 1. Relationships Among Processors and Field Devices

Before you can configure a transmitter using the IFDC, you must use the Integrated Control Configurator (ICC) to add an Equipment Control Block (ECB) or window ECB for the transmitter to the system. Each type of ECB contains a set of parameters that allow normal I/A Series system operation and describe the transmitter. The ECB types supported in the IFDC are:

- ECB12: With the configuration HWTYPE = 243; SWTYPE = 12 for FoxCom 8 Channel devices.
- ECB13: HTG (Solaris only).
- ECB18: 820, 860, and I/A Series system Pressure Transmitters, RTT10 and RTT20/TI20 Temperature Transmitters, IMT10, IMT20, IMT25, IMT25L, and IMT96 Magnetic Flow Transmitters, 870ITPH pH/ORP/ISE Transmitters, 870ITEC Electrochemical Transmitters, 870ITCR Conductivity/Resistivity Transmitters, 140 Series Pressure and Level Transmitters, and 83 Vortex Flowmeters.
- ECB22: CFT10 Mass Flowmeters.
- ECB23: With the configuration HWTYPE = 243; SWTYPE = 23 for FoxCom 4 Channel Isolated.
- ECB74: SRD991 Intelligent Positioner.

- ECB200: With the configuration HWTYPE = SWTYPE = 214 or 244 for HART transmitters. With the configuration HWTYPE = SWTYPE = 215 or 244 for HART output devices (for example SRD991 Intelligent Positioner).
- ECB201: Child Device ECB for Parent ECB200 with the configuration HWTYPE = SWTYPE = 214 or 244 for HART transmitters. With the configuration HWTYPE = SWTYPE = 215 or 244 for HART output devices (for example SRD991 Intelligent Positioner). For Redundant Parent ECB202, with the configuration HWTYPE = SWTYPE = 216 or 245 for HART transmitters and with the configuration HWTYPE = SWTYPE = 218 or 245 for HART output devices (for example SRD991 Intelligent Positioner).
- ECB202: For redundancy with the configuration HWTYPE = SWTYPE = 216 or 245 for HART transmitters. For redundancy with the configuration HWTYPE = SWTYPE = 218 or 245 for HART output devices (for example SRD991 Intelligent Positioner).

— NOTE

For more information on the ICC, refer to *Integrated Control Configurator* (B0193AV) and *Integrated Control Block Description* (B0193AX).

If you make any changes in the field with a Hand-Held Terminal (HHT), PC10 Configurator, or PC20 Configurator, always upload the changes to the I/A Series system database. Then compare the I/A Series system and the device database. See “Compare Function” on page 50.

PC20

The PC20 Configurator hardware/software package is designed to run from a PC with a Windows NT®, Windows® 95, Windows 2000, and Windows XP operating system. It does not run with a Windows 3.1 or Windows CE operating system.

— NOTE

Windows 98 or Windows ME is not a Foxboro approved corporate software operating system. However, problems are not expected when using PC20 with the Windows 98 or Windows ME operating system.

The package includes an external modem that allows operation with any Windows compatible computer with the following minimum requirements:

- 133 MHz Pentium® with 32 MB RAM or better
- 4x CD-ROM Drive (8x recommended)
- Hard drive with 16 MB of space for PC20
- RS-232 Serial Port (COM1 or COM2)
- Parallel Port (LPT1 or LPT2) to print reports
- Mouse or compatible pointing device.

Communication with Foxboro Intelligent Devices uses proven frequency shift keying (FSK) techniques that do not affect the device output signal.

Standard Equipment with FoxCom Modem

The PC20 with a FoxCom modem includes the following items:

- PC20 software on one CD-ROM
- One Foxboro external modem (can be attached by Velcro® strips to back side of laptop computers)
- One 5-foot cable (desktop PC to modem)
- One 1-foot cable (laptop PC to modem)
- One 5-foot cable for connecting the modem to device loop wiring or for connecting the optional power supply to a device
- Velcro strips
- Instruction book on one CD-ROM
- Two test clips.

Standard Equipment with HART Modem

The PC20 with a HART modem includes the following items:

- PC20 software on one CD-ROM
- One HART external modem
- One 5-foot cable for connecting the modem to device loop wiring or for connecting the optional power supply to a device
- Instruction book on one CD-ROM
- Two test clips.

Optional Equipment

The power supply option (120 V ac to 24 V dc converter) is used with devices that require a 24 V dc supply. The option is not required to power the modem because the power for the modem is obtained through the serial port connection to the PC. The power supply option cannot be used with ac line powered devices such as mass flowmeters and magnetic flow transmitters. It can only be used with the SRD991 Intelligent Positioner when the positioner is configured for FoxCom digital output.

! CAUTION

You can potentially damage an SRD991 Intelligent Positioner by attaching a dc power supply to its 4 to 20 mA input terminals. The positioner input is a mA source, not a voltage source. Therefore, the power supply option must not be used with any HART protocol positioner or any FoxCom protocol positioner configured for 4 to 20 mA input.

Field Device Restrictions

IFDC

The Intelligent Field Device Configurator for I/A Series system AW/WP51 (Solaris) and AW/WP70 (Windows based PCs) stations supports all Intelligent Field Devices listed in Table 2. For some devices, there are restrictions in the device support as described below.

Non Foxboro Devices (HART Protocol)

Only the Universal and Common Practice commands are supported. Device-specific commands are not supported.

CFT10

Component Tag parameters for the Solids Configuration cannot be configured using IFDC. The PC20 does allow component tag configuration.

CFT15

The CFT15 is a Modbus® device. Therefore, IFDC running on I/A Series system stations cannot configure the CFT15. The PC20 does support configuration and calibration of the CFT15.

SRD991

Setpoint Source (output mode) is not configurable from IFDC. The PC20 does allow configuration of the setpoint source.

HTG

HTG configuration is possible only with IFDC on the primary display of AW/WP51 stations. The ECB13 default display for the standard I/A Series system Display Manager and for FoxView™ has the incorrect command behind the **IT Maint** button. For this reason, the IFDC upgrade CD for the Solaris operating system installs new versions of the ECB13 default displays. You **must** have FoxView Version 6.0e or later in order to have the ECB13 FoxView display work correctly. If an older version of FoxView is installed and IFDC is installed, the ECB13 default display does not work correctly and provides erroneous information. Also, after IFDC is installed, installation of any upgrade of FoxView prior to I/A Series system Version 6.2 overwrites the corrected FoxView ECB13 default display.

IFDC HTG configuration is not possible from AW/WP70 stations. In order to maintain commonality between FoxView™ default displays on Solaris and Windows based stations, the ECB13 default display on Windows based I/A Series system stations continues to have an **IT Maint** button. However, do not attempt to invoke IFDC on a Windows based I/A Series system from the ECB13 default display **IT Maint** button, as unpredictable results may occur.

PC20

Version 2.2 of the PC20 Configurator supports all devices listed in Table 2. For some devices there are restrictions in the device support as described below.

HTG

PC20 does not support HTG. The integral keypad and display on the device can be used for configuration functions. HTG can also be configured using IFDC (restrictions apply).

Non Foxboro Devices (HART Protocol)

Only the Universal and Common Practice commands are supported. Device-specific commands are not supported.

Software Version 2.0 Enhancements

Software Version 2.0 includes the following enhancements:

- Full configuration capability for IMT25 Magnetic Flow Transmitter with HART protocol
- Full configuration capability for 83 Series Vortex Transmitter with HART protocol
- IMT96 Magnetic Flow Transmitter with FoxCom protocol
- IGP10 Gauge Pressure Transmitter with Sensor F, G, and H
- IAP20 Absolute Pressure Transmitter
- An updated 140 Series Buoyancy Transmitter
- Calibration capability and IFDC support for 870ITCR Conductivity/Resistivity Transmitter
- 130 Series Pressure Transmitter
- New functionality (FoxCom and HART protocol)
  - Workshop Environment for faster communications
  - Support for HART multi-drop communication
  - Info Window (Device Characteristic, Audit Trail, and Error Trace)
  - Export function for trending
  - Startup options (Online/Offline, password, and security level)
  - Import/Export device databases to popular database programs
- Improved functionality (FoxCom and HART protocol)
  - Improved communications with devices integrated to I/A Series system
  - Improved information and layout on database printing.

Software Version 2.2 Enhancements

Software version 2.2 includes the following enhancements:

- Full configuration for Multi-range Pressure Transmitter IxP25
- Full configuration for Premium Multi-range Pressure Transmitter IxP50
- Full configuration for Invensys and Viatran Transmitters using the HART Protocol

- Full configuration for the FoxCom and HART Intelligent Positioners SRD960, SRD970, and NAF LinkIT
- New and improved functionality:
  - Starting IFDC/PC20 is now independent of the protocol. It is possible to connect to one device with FoxCom protocol and afterwards connect to another with HART protocol without the need to leave and restart IFDC/PC20.
  - Pre-Configuration for devices with different protocols (HART, FoxCom) could be done in parallel.
  - There is a new **File > New** dialog. This selection dialog shows in a tree view all supported protocols and devices.
  - Enhanced Generic HART configuration dialog boxes.

PC20 Software Version 2.2 includes the following enhancements:

- Full configuration for the Profibus-PA Intelligent Positioners SRD991, SRD960, SRD970, and NAF LinkIT.
- Full configuration for the 140 Series Profibus-PA Buoyancy Transmitter.

IFDC Software Version 2.2 includes the following enhancements:

- Full configuration support for all Foxboro and Foxboro Eckardt HART devices as listed in Table 2.

Software Version 2.3 Enhancements

PC20 Software Version 2.3 includes the following enhancements:

- Support of Window 2000 and Windows XP stations
- Configuration support for I/A Series Pressure IGP10-B
- Configuration support for the 140 Series 240 subtypes.

IFDC Software Version 2.3 includes the following enhancements:

- Support of the Windows XP stations
- Support of the Solaris 8 stations.

Software Version 3.0

- IFDC Software Version 3.0 is identical to Version 2.3 but is for use on workstations with I/A Series System software V8.2 and greater. The Solaris operating system is not supported in this version.

Software Version 3.1

- IFDC Software Version 3.1 is identical to Version 3.0 but includes the following enhancements:
  - Support for HART FBM244 and FBM 245
  - Support for FoxCom FBM243b and FBM246b.

Reference Documents

Table 3. Reference Documents

Device Type	Description	Instruction
I/A Series system	*System Equipment Installation*	B0193AC
	Integrated Control Configurator	B0193AV
	Integrated Control Software Concepts	B0193AW
	Integrated Control Block Description	B0193AX
	Measurement Integration	B0193RA
	Intelligent Field Device Configurator (IFDC) Release Notes	B0400QL
I/A Series Intelligent Transmitters	Wiring Guidelines	MI 020-350
Model HHT Hand-Held Terminal	Operation	MI 020-466
PC10 Intelligent Transmitter Configurator	Installation and Operation	MI 020-479
83F and 83W Intelligent Vortex Flowmeters	Installation, Configuration, Troubleshooting, and Maintenance (FoxCom Protocol)	MI 019-194
	Installation, Configuration, Troubleshooting, and Maintenance (HART Protocol)	MI 019-199
820 Series Intelligent Transmitters	Operation, Calibration, and Configuration with HHT	MI 020-467
860 Series Intelligent Transmitters	Operation, Calibration, and Configuration with HHT	MI 020-474
I/A Series Intelligent Pressure Transmitters	Installation, Calibration, Configuration, and Maintenance (FoxCom Protocol)	MI 020-421 MI 020-424 MI 020-428 MI 020-429
	Installation, Calibration, Configuration, and Maintenance (HART Protocol)	MI 020-416 MI 020-417 MI 020-423 MI 020-426
	Operation, Calibration, and Configuration with HHT	MI 020-476
IMT10 I/A Series Magflow Transmitters	Operation, Calibration, and Configuration	MI 021-376
IMT20 I/A Series Magflow Transmitters	Operation, Calibration, and Configuration	MI 021-383
	Operation, Calibration, and Configuration with HHT	MI 021-385

Table 3. Reference Documents (Continued)

Device Type	Description	Instruction
IMT25 I/A Series Magflow Transmitters	Operation, Calibration, and Configuration	MI 021-390
	Operation, Calibration, and Configuration with HART Communications	MI 021-397 MI 021-398
IMT96 I/A Series Magflow Transmitters	Operation, Calibration, and Configuration	MI 021-403
CFT10 Series Mass Flow Transmitters	Operation and Configuration with Integral Keypad	MI 019-122
	Operation, Calibration, and Configuration with HHT	MI 019-123
CFT15 Series Mass Flow Transmitters	Operation, and Configuration with Integral Keypad	MI 019-128
870ITCR Conductivity/Resistivity Transmitters	Installation, Configuration, Operation, and Maintenance	MI 611-216
870ITEC Electrodeless Conductivity Transmitters	Installation, Configuration, Operation, and Maintenance	MI 611-212
870ITPH pH/ISE/ORP Transmitters	Installation, Configuration, Operation, and Maintenance	MI 611-211
RTT10 Series Temperature Transmitters	Installation, Maintenance, and Wiring	MI 020-459
	Operation, Calibration, Configuration with HHT	MI 020-468
RTT20 Series Temperature Transmitters	Installation, Configuration, Operation, Calibration, and Maintenance	MI 020-453
	Operation, Configuration, and Calibration with HART Communicator	MI 020-460
	Operation, Calibration, and Configuration with HHT	MI 020-469
TI20 Temperature Transmitters	Installation, Configuration, Operation, and Maintenance	EMT 0111 A
SRD991 Intelligent Positioner	Installation, Configuration, Operation, and Maintenance	MI EVE 0105 A
130 Series Pressure Transmitters	Installation, Configuration, Operation, and Maintenance 131GP/132AP 133DP 134FP 134LD 134LVD	 EMP 0510 A EMP 0530 A EML 2510 A EML 0510 A EML1510 A

Table 3. Reference Documents (Continued)

Device Type	Description	Instruction
140 Series Pressure and Level Transmitters	Installation, Configuration, Operation, and Maintenance	
	141GP/142AP	EMP 0610 A
	143DP	EMP 0630 A
	144FP	EML 2610 A
	144LD	EML 0610 A
	144LVD	EML 1610 A

2. Installation

PC20 Hardware Installation

WARNING

The FoxCom and HART modems shipped with the PC20 are **not** intrinsically safe and should not be connected directly to an intrinsically safe circuit. It is permissible to connect these modems to the safe side of an intrinsically safe barrier.
The HHT (FoxCom protocol) or Model 275 (HART protocol) hand-held configurator, used in an area for which it is certified, can be connected to an intrinsically safe circuit for which it is rated.
The MOD991 modem, used with the PC20 in a safe area, can be connected to intrinsically safe circuits for which it is rated.

CAUTION

You can potentially damage an SRD991 Intelligent Positioner by attaching a dc power supply to its 4 to 20 mA input terminals. Refer to MI EVE 0105 for detailed wiring connections.

NOTE

All hardware used with the PC10 configurator can be used with the PC20. Just load the PC20 software into your personal computer and use your existing hardware. All PC20 connections between the computer, the device, and the modem are identical to those used with the PC10.
Do not use PC10 and PC20 on the same personal computer in sequence. The packages use different drivers. You must reboot your system if you want to use the PC10 after using PC20 and vice versa.

NOTE

All hardware used with the ABO991 configurator can be used with the PC20. Install the Windows operating system and load the PC20 software into your personal computer and use your existing hardware. All PC20 connections between the computer, the device, the modem, and the optional power supply are identical to those used with the ABO991.

Attaching the Modem to the Serial Port

Attach your modem to your computer serial port (COM1 or COM2). If the computer serial port has a 25-pin connector, use a 25- to 9-pin adapter.

NOTE

It is possible to use COM port 3 and COM port 4 but you must determine and enter the Base Port Address (hex) and the Interrupt Request (IRQ) data.

Connecting the Modem to a Field Device

NOTE

1. The loop must have a minimum of 250 ohms between the power supply and the attachment of the modem.
2. PC20 can communicate with devices connected in a HART multidrop loop.

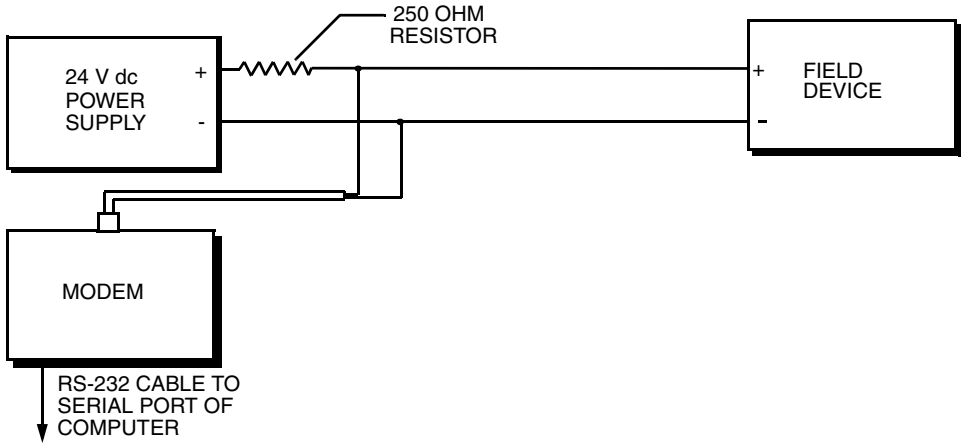


Figure 2. Analog FoxCom or HART Device with Remote Power

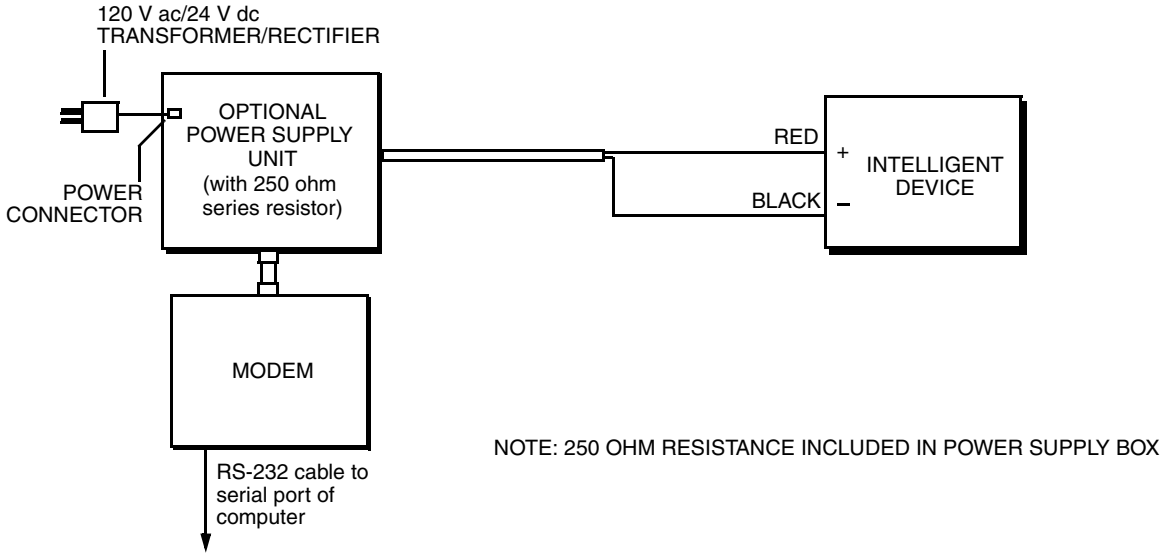


Figure 3. FoxCom Device with Optional Power Supply

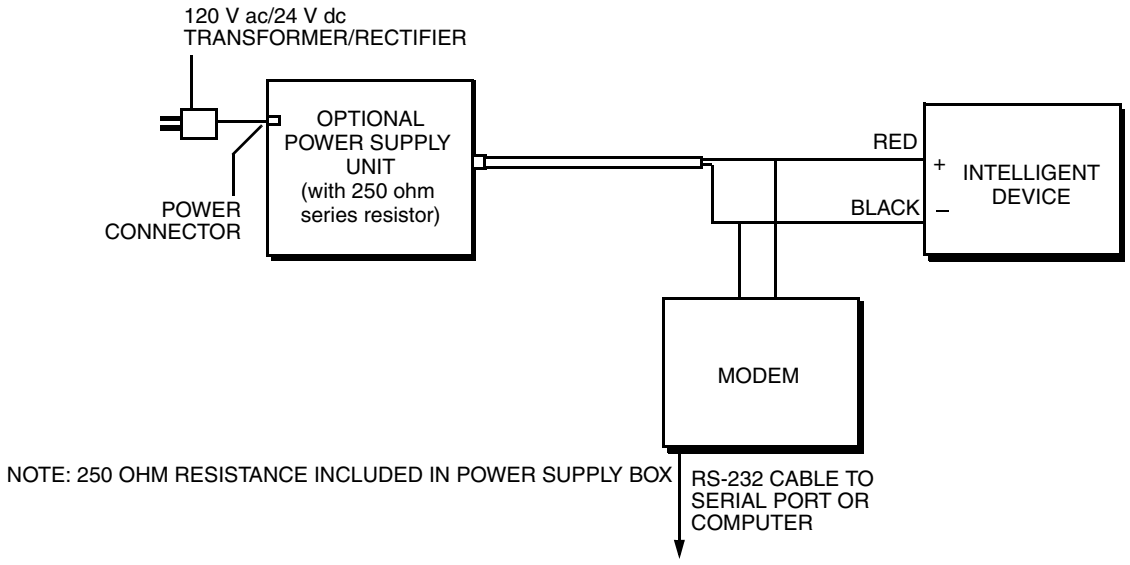


Figure 4. HART Device with Optional Power Supply

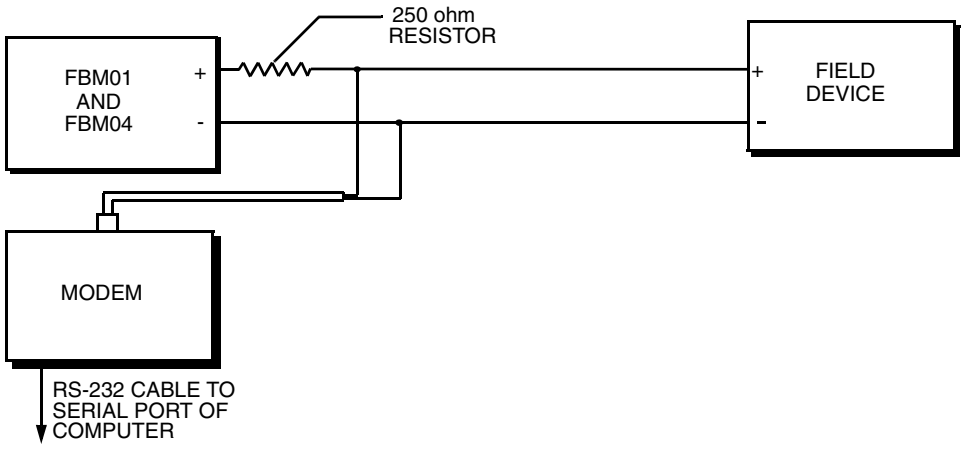


Figure 5. Analog FoxCom or HART Device Connected to I/A Series System FBM01 or FBM04

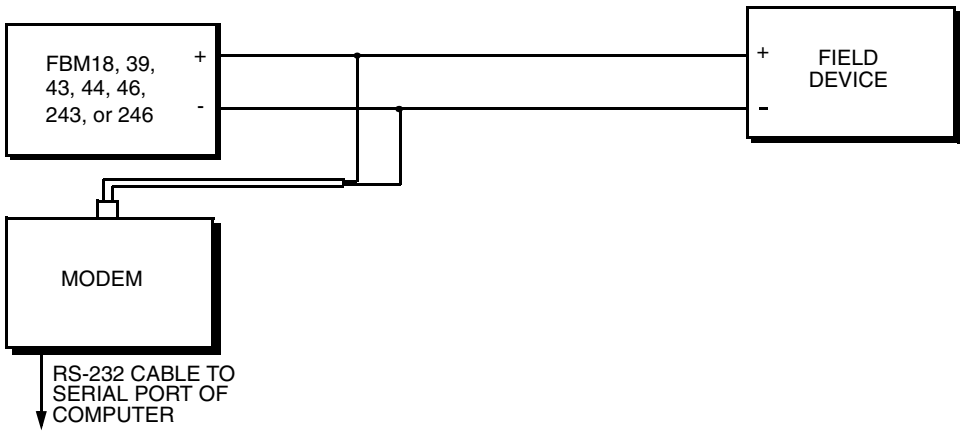


Figure 6. Digital FoxCom Device Connected to I/A Series System FBM18, 39, 43, 44, 46, 243, or 246

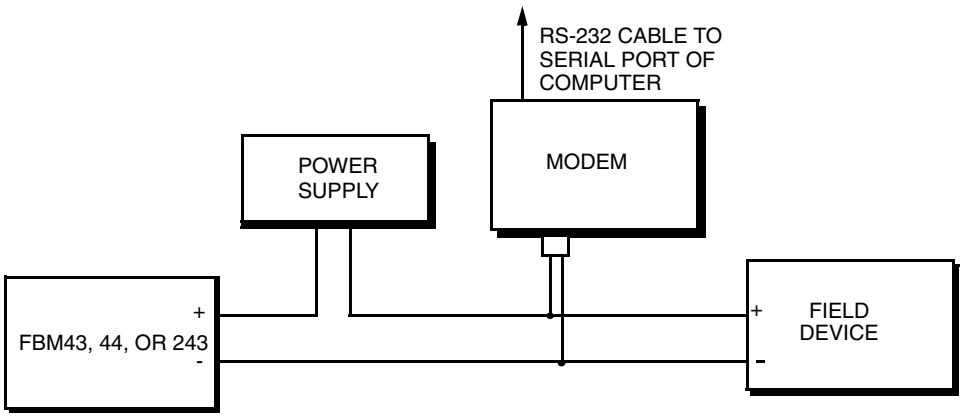


Figure 7. Analog or Digital FoxCom Device Connected to I/A Series System FBM43, 44, or 243 with Remote Power

Connecting a Printer

If hard copy reports are required, a standard text printer with a parallel interface connected to the PC printer port (LPT1 or LPT2) or a network accessible printer must be provided. Reports can also be saved to text files and printed later.

Hardware Installation for Profibus Device

To connect your PC to a Profibus-PA device (for example, SRD991, 140 Series) the following components are needed:

1. A Profibus interface card from Softing AG with the PAPI software interface. For a desktop PC, the following interface cards could be used:
   - PROFIboard ISA Master/Slave (PB-IF-03)
   - PROFIboard PCI Master/Slave (PB-IF-1MS)
   - PROFIboard PCI with 1xMaster and 1xMaster/Slave (PB-IF-2MS).

For a laptop it could be a PC card (PCMCIA) for Type II slots:

- PROFIcard Master PB-PCcard).

2. A segment coupler for Profibus-PA, for example, from Pepperl+Fuchs (KFD2-BR-Ex1.2PA.93). This coupler is needed to couple the Profibus-DP™ side (supported by the Softing interface cards) with the Profibus-PA devices in the Profibus-PA segment.

PC20 Software Installation

Perform installation while running the standard Windows based installation program. Close all other running programs before starting your installation.

Install the CD-ROM in your computer and select:

Start
Settings
Control Panel
Add/Remove Programs

Then follow instructions to install the PC20 program using A:\Setup as the command.

The installation procedure is automatic and prompts you for necessary information. The installation program verifies that the PC has the hardware and memory necessary to load and run PC20.

After installation is complete, reboot your computer.

Software Installation for Profibus Cards

For the PROFIboard or PROFIcard, the appropriate driver and Profibus Control Panel from Softing must be installed. Please refer to the user manual from Softing for detailed installation description.

Before you start PC20 for Profibus Devices, check to see if the Profibus interface card is working correctly.

- Go to **Control Panel > Profibus**.
  The Profibus Control Panel software from Softing should show a green mark at the chosen interface card node.
- If you have any problems installing the Softing interface please contact Softing AG:
  Phone +49 (0)89 4 56 56-0
  Email *support.communication@softing.com*.

IFDC Software Installation

For IFDC software installation, refer to *Intelligent Field Device Configurator (IFDC) Release Notes* (B0400QL).

PC20 Instruction Book CD-ROM Installation

The PC20 instruction book for the Intelligent Field Device Configurator is provided on CD-ROM. Put the CD-ROM into the CD-ROM tray and install per the instruction on the CD-ROM label. After installation, launch the PC20 program. Then select **Options > Settings** from the toolbar. In the **Directories** tab screen, the following run command in the **MI** dialog box might be displayed:

C:\Acrobat3\Reader\AcroRd32.exe D:\PC20\ENTRY.PDF

PC20 tries to find the executable for the Acrobat Reader® and enters it on the left side. (In this example C:\ is the drive containing the Acrobat Reader.) Please correct this entry if the path entry is not correct or you want to use another version of the Acrobat Reader. The second part points to the path with the Instruction Book CD-ROM. (In this example, D:\ is the CD-ROM drive.)

Please remember that the CD-ROM must be installed in the drive when accessing the instruction book (via the MI icon on the toolbar).

3. Operation

Running the PC20 Program

To run the program, double-click the PC20 icon or access the program from the **Start** menu.

The PC20 program may be started with different arguments. To see the program arguments, right-click on the shortcut icon and select **Properties**. Select the **Shortcut** tab. The **Target** dialog box shows the program arguments.

After installation of PC20, the program arguments are defined as follows: For example, "C:\Program Files\Foxboro\FoxIFDC\foxifdc.exe" -prot all

This program argument causes PC20 to start in the flexible protocol mode. After starting PC20 the user is asked for the protocol of the device to which a connection should be established. Select the protocol (for example, FoxCom, HART or Profibus) and press OK to connect to the device. Select Cancel if PC20 should not connect to a device and to do Pre-Configuration. In the flexible protocol mode it is possible to connect to one device with FoxCom protocol and afterwards to connect to another device with HART protocol without the need to leave and restart PC20. Furthermore Pre-Configuration for devices with different protocols (HART, FoxCom, Profibus) could be done in parallel.

If PC20 should always connect to a device with the same protocol at startup, set the "-prot" keyword, which indicates the protocol.

- For FoxCom devices, set the following protocol flag:
  "C:\Program Files\Foxboro\FoxIFDC\foxifdc.exe" -prot X
- For HART devices, set the following protocol flag:
  "C:\Program Files\Foxboro\FoxIFDC\foxifdc.exe" -prot H
- For Profibus set the following protocol flag:
  "C:\Program Files\Foxboro\FoxIFDC\foxifdc.exe" -prot P

If PC20 is not yet connected to a device, the top level menu screen, as shown in Figure 18, appears. This top level screen has a pull-down menu for selecting the various functions. If PC 20 is already connected to a device, the device data screen, similar to that shown in Figure 18, appears.

Use the mouse and/or cursor as you would in any standard Windows program. You can move the cursor from item to item by using the mouse, the arrow keys, or by pressing the underlined letter of the menu item. You can select the highlighted menu item by clicking the left button of the mouse or by pressing **Enter**.

Running the IFDC Program

Start IFDC on the I/A Series workstations one of two ways:

1. Using the standard I/A Series Display Manager or FoxView, the default displays for the ECBs which support Intelligent Devices (for example, FoxCom, HART) have an **IT Maint** or **IFDC** button. Selecting the **IT Maint** (or **IFDC**) button starts IFDC and IFDC connects directly to the displayed device.

2. From the menu of the standard I/A Series Display Manager or FoxView select **Config - IT_Maint** to start IFDC. IFDC displays the Device Selection Dialog. The Device Selection dialog shows in a tree structure the CPs, ECBs and channels (device block names) which are able to support Intelligent Devices. After you select a channel and press the **Connect** button, IFDC establishes a connection to the selected device.

NOTE

After configuration changes (for example, after new FBMs and devices are added), the tree information within the Device Selection dialog boxes needs to be updated by selecting the **Refresh** button.

General Information

Because the programs can be connected to a variety of Foxboro Intelligent Devices and can perform a variety of functions, menu items may be missing or "grayed out." Missing menu items are never allowed for the connected device. Grayed out items are not allowed under the present condition but may be allowed under different conditions. For example, mA Calibration would be available for a device configured with a 4 to 20 mA output but grayed out for a device configured for a digital output.

Database Files

The tremendous benefits derived from using microprocessor-based devices is well known and accepted throughout the process control industries. But the advantages also require the proper management of the database files. The field device contains the Master database. It is suggested that you also save a computer-based database file of each device to help facilitate a quick and easy repair if needed. If an amplifier were to fail and the database were stored in the computer, the repair would be fast and easy. Just replace the amplifier, call up the stored database file from the computer, and download it to the repaired device. For most devices, the repair is completed without even recalibrating the device (see the device-specific instruction for the detailed replacement procedure).

When dealing with any Intelligent Device, you must remember that there are multiple database files accessed while using the IFD Configurator software:

- The master database file stored in the EEPROM of the device
- A stored database in the computer, which should always be updated when the device parameters are changed
- A temporary database file that is active in the software program while you are making parameter changes. This temporary file normally would be downloaded to the connected device or stored as a database file in the computer.
- When digitally connected to an I/A Series system, the system contains the complete database file in the active control software, based upon the last time the database was uploaded from the device.

File Management

It is strongly recommended that you save each device database to a file. When you save the device database, the default filename uses the first eight characters from the tag number of the device. You may modify your database filename by using up to 256 characters, which constitutes a long filename in Windows based operating systems.

Every time a device database is modified by using any of the configuration tools (PC10, PC20, HHT, ABO991, M275, and integral pushbuttons), the new database should be saved. When it is saved using the default first eight characters from the device tag number, the old database file is overwritten by the new file. If you want to save the old database file configurations, you have to change the filename. One suggestion would be to add the date of the database change to the electronic filename to aid tracking down the latest file.

File Location for PC20

When the software is installed, the default location for all of the database files is:

C:\Program Files\Foxboro\IFDC\Data

This location is the default storage location unless modified during the installation of PC20 software. To help locate various devices by instrument type, rather than just by tag number, you may want to add subdirectories to the default location, such as:

Pressure
Flow
Level
Electrochem
Positioners.

Also, if the plant has both FoxCom and HART devices, you may want to add subdirectories of HART and FoxCom before or after the above suggested subdirectories.

Database File Compatibility

PC20 to PC20

Any database file created with an earlier PC20 release (for example, 1.0 or 2.0) is totally compatible on any other computer running the latest PC20 revision. Any database file created with PC20 BETA software may not be compatible. If you were a Foxboro BETA tester, we recommend that you resave all device database files.

PC20 to IFDC

- Beginning with Version 2.2. of PC20 and IFDC, any PC20 database for any device other than the Mass Flow Transmitter (CFT10 and CFT15) is interchangeable with IFDC (Windows and Solaris versions).
- For database files generated with PC20 versions before Rev 2.2 the following restrictions must be considered:

- Any PC20 database for any device other than the Mass Flow Transmitter CFT10 is interchangeable with IFDC (Windows version only)
- Any Mass Flow Transmitter (CFT10 and CFT15) database created in PC20 is not compatible with a Solaris or Windows version of IFDC
- Any PC20 database for any device is not compatible with IFDC (Solaris version only).

- For database files generated with PC20 versions before Rev 2.2 the following restrictions must be considered:
  - Any PC20 database for any device other than the Mass Flow Transmitter CFT10 is interchangeable with IFDC (Windows version only)
  - Any Mass Flow Transmitter (CFT10 and CFT15) database created in PC20 is not compatible with a Solaris or Windows version of IFDC
  - Any PC20 database for any device is not compatible with IFDC (Solaris version only).

IFDC to PC20

- Beginning with Version 2.2. of PC20 and IFDC, any IFDC (Windows and Solaris version) database for any device other than the Mass Flow Transmitter (CFT10 and CFT15) is interchangeable with PC20.
- For database files generated with IFDC versions before Rev 2.2, the following restrictions have to be considered:
  - All IFDC databases for any device created with a Solaris system are not compatible with PC20.
  - All IFDC databases for any device created with a Solaris system are not compatible with IFDC on a Windows based system.
  - All IFDC databases for any device other than a Mass Flow Transmitter created on a Windows based system are interchangeable with PC20.
  - Any Mass Flow Transmitter database created in a Solaris or Windows version of IFDC is not compatible in PC20.

— NOTE

IFDC and PC20 versions before Rev 2.2 have several restrictions to exchange the device database files. Beginning with Version 2.2. of PC20 and IFDC (Windows and Solaris versions), the device database format changed to overcome these restrictions. It is recommended that, after the upgrade to Rev. 2.2, all device database files should be stored in the new format (use menu File - Save). This new file format will also be supported in successive versions of the Intelligent Field Device Configurators.

— NOTE

The old device database format (created by IFDC or PC20 versions before Rev. 2.2) will no longer be supported (after Rev. 2.2). Please resave all device database files with the Rev. 2.2 release.

ABO991 to PC20/IFDC

HART database files created in ABO991 are not compatible with PC20 and IFDC. If you are using ABO991 V3.6, it is possible to write a PC20 specific database file which can be imported to the PC20 software using **File > Import**.

The **Import** menu item is only available when connected to a device or when an off-line configuration dialog is open (preconfiguration using **File > Open** or **File > New**). To convert ABO991 database files into PC20 database files:

1. Generate the PC20 files using ABO991 V3.6.
2. Within PC20 select **File > New.** Select the same device type as stored in the ABO991 database file.
3. Select **File > Import** to import the ABO991 database file. Select **Override Configuration Data Only** if only the configuration data should be imported. Select **Override Full Database** if all data should be imported.
4. Save the PC20 file using **File > Save**.

PC10 to PC20

The vast majority of a PC10 database file is compatible with PC20. However, the PC10 database file has no internal marker to indicate if it contains valid calibration data. For example, a **preconfigured** PC10 database file does **not** contain valid calibration data [the calibrated range (LRV and URV) are part of the user database and will be downloaded]. Therefore, when you open a PC10 database file in PC20, you can only download the user database, which does not contain the calibration information. But once you have downloaded that PC10 file using PC20, you can just resave the device database back to the file and it then includes any specific calibration information previously stored in the device.

! CAUTION

The PC10 database format will no longer be supported (after IFDC/PC20 Rev. 2.2). Please resave all device database files with the IFDC/PC20 Rev. 2.2 release.

HART Model 275 Hand Held Configurator to PC20/IFDC

All database files created with a HART Model 275 hand held configurator are not compatible with PC20/IFDC.

HHT to PC20

There is a database file transfer function in PC10 that allows direct upload of databases from a HHT when the HHT and PC10 are physically connected to each other. That function is not implemented in PC20.

PC20 to PC10/ABO991

The Windows based PC20 database files are not backward compatible with the older MS-DOS® based PC10 and ABO991 software.

Import/Export PC20 Database Files to Popular Database Software Programs

IFDC/PC20 has an Import/Export function to exchange database files with popular database software programs. See more details about the Import / Export format in “ASCII Format for Import and Export” on page 48.

Device Output Protection

If a selected function modifies the device output, the caution shown below is displayed:

```
The device's output is modified during this procedure. Leaving the
control loop in automatic may cause a process upset. Press Continue
when the control loop is in manual mode, or Cancel to abort.
```

Toolbar

The program is equipped with a toolbar at the top of the screen. It can be shown or hidden at any time by using the **View** menu. The icons on the toolbar are shown in Figure 8. A listing of the features and descriptions for the toolbar is given in Table 4.

Figure 8. Toolbar Icons

Table 4. Toolbar Features and Descriptions

Item	Feature	Description
1	Preconfigure New	Creates a preconfiguration database using a default database as a template.
2	Database Edit	Edits an existing stored configuration database.
3	Save	Saves the active configuration database to a file.
4	Print	Prints the active configuration database.
5	FoxDoc™	Executes the FoxDoc application.
6	MI	Displays the instruction manual.
7	About	Displays the software version number.
8	Help	Enables user to click on any item so that help for that item is displayed.

An additional communication toolbar is also displayed at the top of the screen. It can be shown or hidden at any time by using the **View** menu. The icons on the toolbar are shown in Figure 9. A listing of the features and descriptions for the toolbar is given in Table 5.

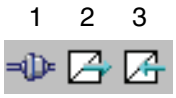


Figure 9. Communications Toolbar Icons

Table 5. Communications Toolbar Features and Descriptions

Item	Feature	Description
1	Connect to Device	Establishes communication to the device connected to the modem for PC20 or brings up the **Device Select** dialog box. Then connects to the selected device.
2	Save to Device	If connected to a device, saves the configuration information to the connected device. Otherwise, not available.
3	Upload Database from Device	If connected to a device, restarts uploading the configuration database from the device again.

Status Bar

The program is equipped with a status bar at the bottom of the screen. It can be shown or hidden at any time by using the **View** menu. The status bar displays four items of information.

- On the left, it displays a brief description of the action of menu items as you navigate through a menu with arrow keys. It also displays a brief description of the action of items in the toolbar.
  On station with Solaris operating system, it displays the text **`An open dialog locks the main window`** when a dialog box is open. This should help you avoid a locking situation where a dialog is open and was pushed behind the IFDC main window. The main window is locked until the open dialog box is closed. Resize the mainframe (make it smaller) so that the dialog box is accessible again or select the **Back** menu item in the upper left system menu and close the open dialog box.
- In the center, it displays the parameter currently being accessed.
- Next, if the active window is connected with the device or if it is a preconfiguration dialog box, it displays the type of connection with the device:
  - **Pre-Config (**preconfiguration)
  - **FoxCom Modem** (direct communication through the FoxCom modem, PC20 only)
  - **HART Modem** (direct communication through the HART modem, PC20 only)
  - **FoxCom FBM** (connection via the I/A Series system FoxCom FBM)
  - **HART FBM** (connection via the I/A Series system HART FBM)
- Last, it displays the communication status or action being taken:
  - **Online (for the selected window there is a connection to the device)**

- **Not connected (for the selected window not device is connected)**
- **Retrieving** (reading information from the device)
- **Storing** (information in the device)
- **Wait for OM** (IFDC is waiting for response from the I/A Series Object Manager)
- **Wait for PT IPC** (IFDC is waiting for response from the I/A Series Pass Thru Interprocess Communication Component).

Info Window

The program is equipped with an info window at the bottom of the screen that can be shown or hidden by using the **View** menu. It can be resized with a mouse. To resize the info window, move the mouse over the border (the courser changes to the resizing symbol) and hold down the right mouse button for resizing. The info window can display three types of information, each with its own tab: **Device Characteristic**, **Audit Trail**, and **Error Trace**.

NOTE

The info window is only displayed when a device is connected. It is not available for preconfiguration.

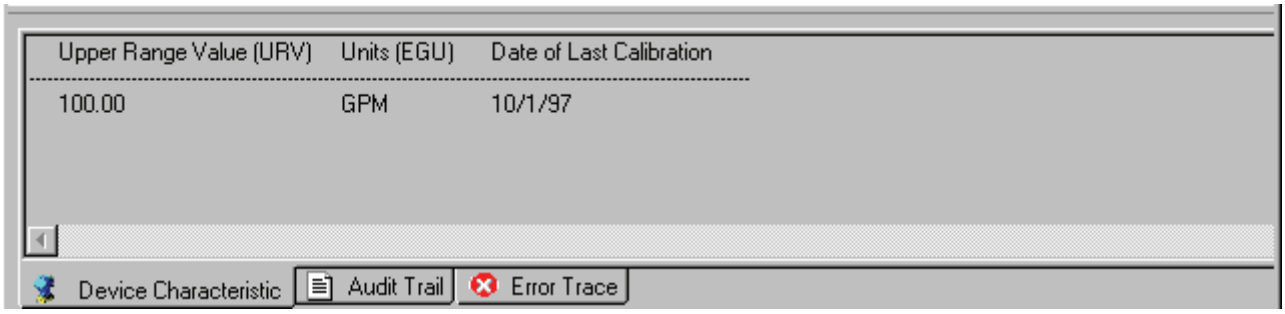


Figure 10. Info Window

Device Characteristic Tab

Under the **Device Characteristic** tab, the info window displays the most important pieces of information, which dominate the behavior of a device. For a transmitter, it is the lower and upper range values, the units, and the date of last calibration.

For some devices (for example, SRD991) it takes a while until the information is loaded from the device and displayed. For other devices, it is displayed immediately.

Audit Trail Tab

Under the **Audit Trail** tab, the info window lists all parameters which are downloaded to the device. Each parameter which is written into a device is listed in a line with the date and time, the parameter name and description, and the value. Dependent upon the protocol, some parameters are written to the device with a command which writes several parameters at once. In such a case, not only the changed parameter is displayed in the **Audit Trail** box, but also all the other parameters which are part of the message.

The Audit Trail collects all changes done with a device during a session. A session starts when IFDC/PC20 connects to the device and ends when the connection is closed. This collection of information is very important in tracking the history of a device. It also helps to control changes during configuration.

It is possible to configure IFDC/PC20 to generate an audit trail file at the end of each session automatically. To enable IFDC/PC20 to do this, you need to include the following statement into the INI file **foxifdc.INI** with a text editor (for example, Notepad). The **foxifdc.INI** file is located in the system directory **C:\WINNT** for Windows NT and Window 2000 operating systems or **C:\Windows** for Windows 95 and Windows XP operating systems. On the Solaris operating system, the initialization file has the path and filename: **/.foxifdc.ini**.

Under **[Directories]** specify the pathname where PC20 should store the audit trail files after the keyword **ADT Path=**.

Example for Windows operating system:	**[Directories]** **ADT** **Path=C:\ProgramFiles\Foxboro\FoxIFDC\data**
Example for Solaris operating system:	**[Directories]** **ADT Path=/temp/**

After each session in which a parameter was written to the device (and only in this case), IFDC/PC20 writes a file into the specified directory. The filename is composed of the Tag Number, the date (Month/Day/Year) and time (Hour:Minute:Second) and has the extension **_ADT.txt.**

Example: **FT101_02-18-00_17-37-52_ADT.txt**

The automatic generation of such files is only possible when the tag number can be used as a valid filename. It should **not** contain special characters such as “\”, “/”, or “:”.

To import the audit trail information into other programs, select the appropriate ASCII import function within the other program.

Example for Microsoft Excel Software

In Microsoft Excel, choose **File > Open**. For the file type, select **Text Files** to list all files and select the desired file with the ending **_ADT.txt**. The Excel Import Assistant guides you through the definition of the import format:

1. Start the import with line number 1.
2. The fields are separated by tabs.
3. Select **General** for all columns.
4. Import the file.

It is now possible to use the Excel functions (for example, sorting) and store this file in the Excel format.

The imported information is displayed in several columns. The first row shows the headings for each column. For each parameter written to the device, you have an additional row. The first column contains the date and time when the change occurred. The second column shows the

unique identifier of each parameter within a device. The third column shows the parameter description. The last column contains the parameter value. The value might be a real, integer, date, string, and so forth.

Example for Microsoft Access® Software

In Microsoft Access® open your database. Choose **File > External Data > Import**. For the file type, select ***.*** and select the desired file with the extension **adt.** The Access Import Assistant guides you through the definition of the import format:

Start the import with line number 1.

The fields are separated by tabs.

The first row contains the headings for each field.

The fields are separated by tabs.

Import the file.

The audit trail information is imported in several fields. For each parameter written to the device, you have an additional row. The first field contains the date and time the change occurred. The second field shows the unique identifier of each parameter within a device. The next column shows the parameter description. The last column contains the parameter value. The value can be a real, integer, date, string, and so forth.

Error Trace Tab

The **Error Trace** tab lists all errors (communication errors, error response messages from the device, and so forth) in a list box. Each error message starts with the date and time. The Error Trace function helps you to track the history of errors during a session.

IFDC uses several background processes (threads), for example, to upload or download parameters or to update the cyclic data. If a background process displays a message (error, warning or information message) in a dialog box, the system may lock up because of thread issues. Therefore, an error in the background process generates a message in the Error Trace window. The Tab window is brought to the foreground and a yellow and white color message button is displayed. This button informs you that there is a new message displayed in the Error Trace window. You should:

- read the message
- acknowledge the message by pressing the **Message** button.

When you acknowledge a message, the **Message** button disappears and the Tab Window that was pushed into the background is pushed to the foreground again. When a new message is generated, the **Message** button pops up again.

When you disconnect a device, this information is lost. To help Foxboro service personnel locate an error, please use the “PC20 Trace Function”or “IFDC Trace Function”described on page 66.

Top Level Menu Screen

The top level menu screen, shown in Figure 11, is displayed when your I/A Series system/personal computer is not connected to a device or when no preconfiguration data is loaded onto a window.

This screen has pull-down menus for selecting the various functions. Explanations of the menus and functions appear in Table 6.

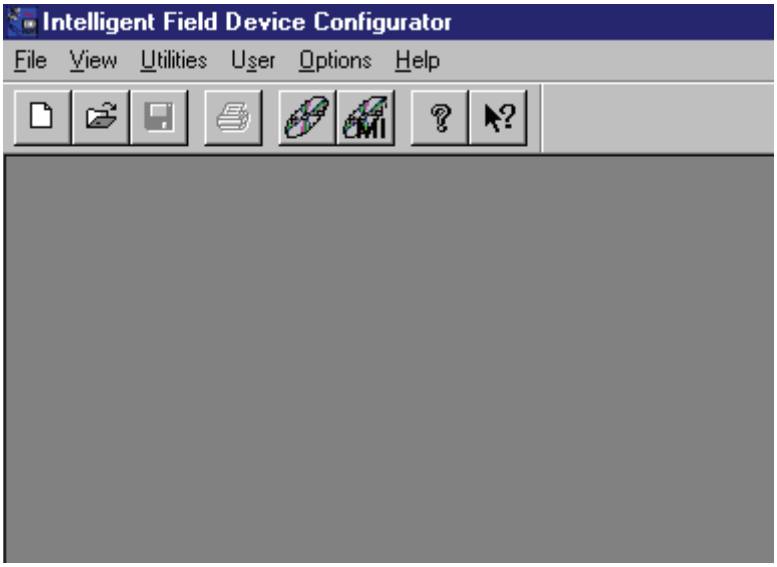


Figure 11. Top Level Menu Screen

Table 6. Top Level Menu – Description of Functions

Top Level Menu Pick	Submenu Pick	Description
File	New Ctrl+N	Creates a preconfiguration database using a default database as a template.
	Open Ctrl+O	Edits an existing configuration database.
	Connect to Device	Connects to a device directly or using I/A Series Pass-Through.
	Print Setup	Changes the printer and printing options.
	(File Names)	Shows most recently accessed files for quick access.
	Exit	Quits the application; prompts to save documents.
	Profibus Configuration	To enable connection to a Profibus device, first the Profibus master must be configured and then the slave address must be defined to connect with the slave device. These tasks may be accomplished in the Profibus Configuration dialog box.
View	Toolbar	Shows or hides the toolbar.
	StatusBar	Shows or hides the status bar.
Utilities	FOX FLOW	Executes the FoxFlow application.
	CON VALVE	Executes the ConValve application.
	FOX DOC	Executes the FoxDoc application.

Table 6. Top Level Menu – Description of Functions (Continued)

Top Level Menu Pick	Submenu Pick	Description
User	MS Word	Executes MS Word.
	MS Excel	Executes MS Excel.
	Run ...	Runs any program.
	(User Application 1)	Launches a user-specified application (if defined).
	(User Application 2)	Launches a user-specified application (if defined).
	(User Application n)	Launches a user-specified application (if defined).
Options	Settings	Modifies the application settings. See details below.
	User	Defines up to nine user applications to add to user menu.
	Change Security Level	Provides password access.
Help	Index	Lists Help topics.
	Using Help	Displays instructions about how to use Help.
	MI	Displays the instruction manual.
	About	Displays the version number.

Settings

Settings is accessed via the **Options** menu. It provides four tab screens: Directories, IFD Modem Setup, Password/Security Options, and Startup Options.

Directories

This tab allows you to identify the location of various programs used in conjunction with the Intelligent Field Device Configurator. Type in the location of the executable file for each application. The **FoxDoc** file for Field Measurement and Control is:

C:\Acrobat3\Reader\AcroRd32.exe D:\FOXDOC\ENTRY.PDF
if C:\ is the drive containing the Acrobat Reader and D:\ is the CD-ROM drive.

The MI file for the Intelligent Field Device Configurator is:

C:\Acrobat3\Reader\AcroRd32.exe D:\PC20\ENTRY.PDF
if C:\ is the drive containing the Acrobat Reader software and D:\ is the CD-ROM drive.

IFD Modem Setup

Follow the instructions that appear when you select this tab.

Password/Security Options

Different security levels can be set to protect the devices from unintended changes or to restrict access to certain functions to certain qualified personnel. Depending on the access level, certain menu items are not available (grayed out or not visible). The following access levels are available:

- **None**: Only allows viewing and documenting device data.

- **Test**: Allows test tasks and tasks listed under **None**.
- **Calibration**: Allows calibration tasks and tasks listed under **None** and **Test**.
- **Configuration**: Allows configuration changes and all tasks listed under **None**, **Test**, and **Calibration**.
- **Workshop**: Allows workshop and factory tasks and all tasks listed under **None**, **Test**, **Calibration**, and **Configuration** (not available for IFDC).

It is possible to configure a different password for each security level (with the exception of **None**).

NOTE

Passwords are case sensitive.

To enter/change a password for a certain security level, select the security level from the menu, type in the old password (if any), the new password, and the new password again under **Confirm Password**. Then select **Apply Password**. To enter no password for a level, leave the **New Password** and **Confirm Password** fields blank.

CAUTION

The Workshop level should be limited to the most knowledgeable people; others can damage the device.

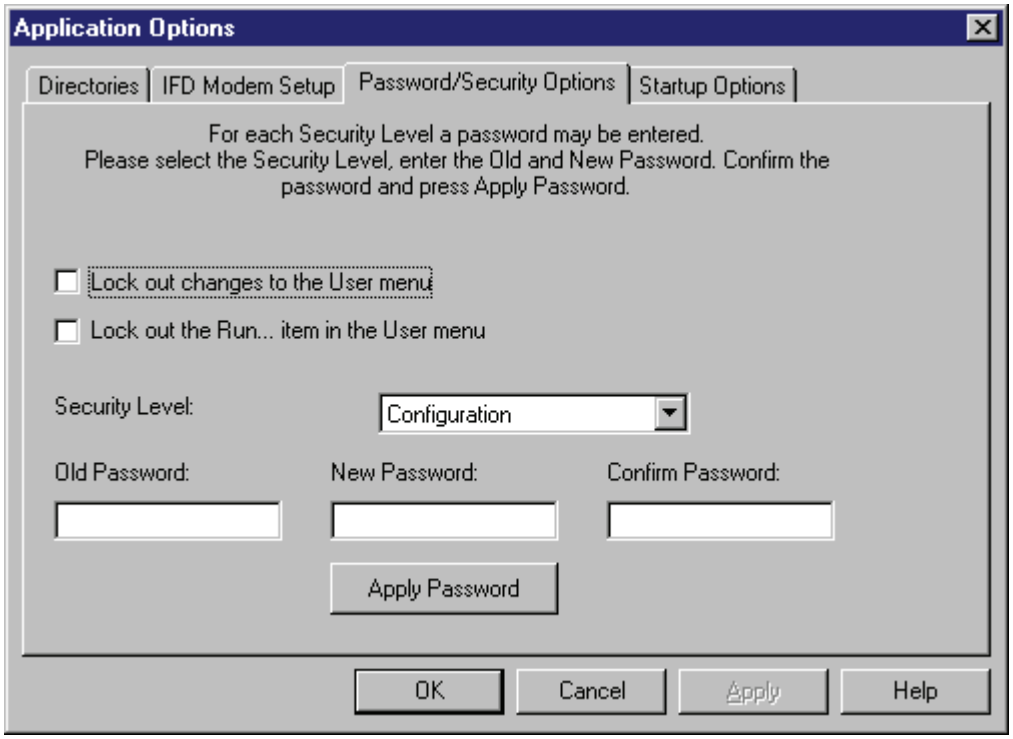


Figure 12. Sample Password Security Options Screen

PC20 Security Protection

Each time PC20 is started, you are asked for the security level and the password for this level. PC20 also allows you to switch off the password protection. If you do not want the password dialog box at startup, select the menu item **Options > Settings > Startup Options** (see "Startup Options" below).

IFDC Security Protection on I/A Series Platforms

The security concept for IFDC is based on the I/A Series security concept. The standard I/A Series system provides security access privilege through configuration of environments. These environments provide security on a per application basis providing the plant with controlled access to these environments. These environments are password protected and configured by the user.

At startup, IFDC checks the access level settings from the FoxView/Display Manager access lock information. FoxView sets a string variable named **<dmname>ACL** (length = 255) to reflect the current state of the FoxView access lock information. **<dmname>** stands for the name of the Display Manager. This string variable is only set by FoxView, not by the Display Manager. If you use the Display Manager and need that variable to be set, you must set it in the respective environment.

In a configuration file named IFDC_Security, the system engineer should define a mapping between the FoxView access lock information and the IFDC access levels. For each IFDC access level (Configuration, Calibration, Test), the engineer can define a mapping. The Workshop access level is not applicable as an IFDC startup option. Configuration is the highest access level to enter IFDC on an I/A Series station.

The file is located under **/opt/fox/ciocfg/ifdenv**. If this file does not exit, IFDC always starts with the access level **Configuration**.

An example of the contents of the IFDC_Security file follows:

```
###############
   Configuration  4
   Calibration    5
   Test           6
   ################
```

Starting with the highest access level (Configuration), IFDC checks if this level is enabled. If this level is enabled, IFDC comes up with the enabled access level. If the access level is not enabled, IFDC checks the next access level mapping. If none of the access levels are enabled, IFDC starts with access level None.

The access lock mapping for the different IFDC access levels can be set to a value in the range of 0 to 255. If the access level gets the lock information 0, it is unprotected/enabled.

Example:

- If Configuration has the value 0, IFDC always starts with the Configuration access level.
- If Calibration has the value 0, IFDC always starts with the Calibration access level, if Configuration is not enabled.

Mapping between the FoxView access lock information and the IFDC access levels:

User Access Level Setting (FoxView/DM Environment Script)	IFDC Access Level Mapping in IFDC_Security	IFDC Startup Access Level
don't care	Configuration 0 (unprotected)	Configuration
setacl 4 + (access level 4 unprotected) **-> <dmname>ACL** is set to **000000**	Configuration 4 (protected)	Configuration
setacl 4 - (access level 4 protected) **-> <dmname>ACL** is set to **000100**	Configuration 4 (protected) Calibration 5 (protected)	Configuration not enabled Calibration enabled

Startup Options

See Figure 13. This tab enables users with the Workshop password to:

- Start the program always off-line or on-line
- Ask the user for a password or not during startup
- Select the security level for startup.

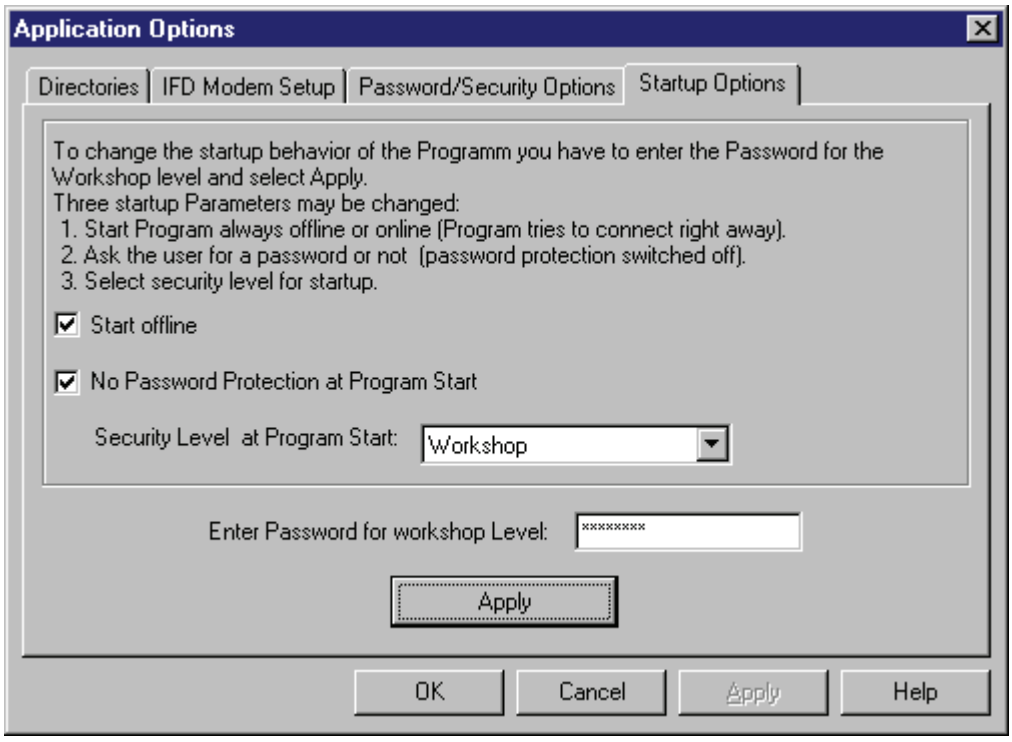

Application Options
Directories
IFD Modem Setup
Password/Security Options
Startup Options
To change the startup behavior of the Programm you have to enter the Password for the Workshop level and select Apply.
Three startup Parameters may be changed:
1. Start Program always offline or online (Program tries to connect right away).
2. Ask the user for a password or not (password protection switched off).
3. Select security level for startup.
Start offline
No Password Protection at Program Start
Security Level at Program Start:
Workshop
Enter Password for workshop Level:
****
Apply
OK
Cancel
Apply
Help

Figure 13. Sample Startup Options Screen

Initial Settings using the INI File

Many Microsoft Windows based programs use an INI file to store initial settings of the program. IFDC/PC20 also uses the INI file to store some initial settings. This file is also used to store user and/or PC specific settings.

The name of the file is **foxifdc.INI**. It is located in the system directory **C:\WINNT** for a station with the Windows NT or Window 2000 operating system or **C:\Windows** on a station with Windows 95 or Windows XP. On a Solaris station, the initialization file has the path and filename: /.foxifdc.ini.

It may be edited with a normal text editor (for example, Notepad on PC or vi on Solaris).

The **foxifdc.INI** file may have three different sections: [**Settings**], [**Directories**] and [**Recent File List**].

In the [**Directories**] section after the keyword "ADT Path=", specify the pathname where IFDC/PC20 should store the audit trail files. If this entry is in the **foxifdc.ini** file, IFDC/PC20 generates an audit trail file in the specified path when parameters are written to the device. See "Audit Trail Tab" on page 26 for more details.

Example for Windows: [**Directories**]

ADT Path= C:\Program Files\Foxboro\FoxIFDC\data

Example for Solaris: [**Directories**]

ADT Path= /temp/

The following entries influence the behavior of the communications via FoxCom modem (for PC20 only):

In the [**Settings**] section, the following entries influence the behavior of the communications. Do not change any of the other entries which are entered by the program itself. The displayed values below are the default times and are in effect when no entry is in the **foxifdc.ini** file. The "x" values are internal times and not equivalent to seconds. The PC hardware, operating system, connected device, protocol, modem, barriers, cable lengths, and so forth can influence the settings. The manual entries must match exactly (wording and spaces) as described below.

CAUTION

There can be many reasons why PC20 may not communicate with a functional device. You may not have a sufficient loop load, the modem could be defective, the cable is attached to the wrong place on the loop wiring, the device you are trying to communicate with is **not** a FoxCom Intelligent Device, and so forth. Therefore, this section only applies if: 1) the communication problem is intermittent - PC20 works OK sometimes and sometimes you get messages such as "Error in Sending a Read Request", or 2) there are no problems communicating to a device in the maintenance shop, but the same computer has communication problems on similar devices installed in the field, or 3) When trying to communicate with a device, both LEDs light up on the modem but you cannot establish communications.

A) For automatic Workshop Environment:

Entry to be typed in the [**Settings**] section	x for Windows 95	x for Windows NT
Start with fast (workshop) communication=x	1	1

Meaning:

PC20 will always start with fast communication switched on. Do not include this entry on PCs that are used to configure devices that are digitally connected to I/A Series FBMs. This will cause communication errors.

B) Communication problems in Workshop Environment using FoxCom protocol:

Entries to be typed in the [**Settings**] section	x for Windows 95	x for Windows NT
gapTime.FoxCom.WS=x	14	14
receiveTime.FoxCom.WS=x	20	20
delayTime.FoxCom.WS=x	2	2
waitTime.FoxCom.WS=x	20	20

Meaning:

These are the default values depending upon the computer used with PC20. Changing the "x" values per the instruction below can greatly reduce communication failures when PC20 is configured for the Workshop Environment and communicates with FoxCom devices.

If you receive a lot of communication errors with the workshop environment turned on, increase the gapTime by one or two digits and check for communication errors. If you still have communication problems, increase the waitTime by one or two digits and check for communication errors. The waitTime must always be larger than the gapTime. If you still have communication errors, repeat steps by increasing the gapTime and then the waitTime.

C) Communication problems with devices digitally integrated to an I/A Series system using FoxCom protocol:

Entries to be typed in the [**Settings**] section	x for Windows 95	x for Windows NT
gapTime.FoxCom.IA=x	14	14
receiveTime.FoxCom.IA=x	20	20
delayTime.FoxCom.IA=x	300	300
waitTime.FoxCom.IA=x	300	300

Meaning:

These are the default values depending upon the computer used with PC20. Changing the "x" values per the instruction below can eliminate communication failures when PC20 is communicating to a device digitally integrated to an I/A Series system through a FBM.

If you get a lot of communication errors when connected in parallel to the I/A Series FBM, you may get better results by changing the gapTime (either increase or decrease the gapTime) by one or two digits. If you still have communication failures, change the

gapTime again in the same direction. If you still have communication errors, change the gapTime to the other side of the default setting by one or two digits.

If the computer is used in both the stand-alone situation and with transmitters digitally integrated to an I/A Series system, you can modify the setting directory, if necessary, for both situations per B and C above. Then, whenever PC20 is being used in the stand-alone situation, manually start the fast communications by selecting **File > Workshop Environment**. But do not modify the Settings section to automatically start the Workshop Environment per A above, because you will get communication errors when attached to a device digitally integrated to an I/A Series system.

Beginning a New Configuration Database

To begin a new configuration database without a connection to a device, select **New** from the **File** menu. The IFDC/PC20 presents the **New** dialog box. This selection dialog box shows in a tree view all the supported protocols and devices (see Figure 14). Select the device with which you wish to work. If a device supports multiple model codes, a secondary model selection screen (see Figure 15) is displayed. Select the model with which you wish to work. The IFDC/PC20 then presents the device top level menu screen for the device and the configuration pages for the model you selected.

The displayed default values in the Configuration pages are stored in the Default database files. The default database files are stored in the subdirectory tables under the installation path (for example, C:\Program Files\Foxboro\FoxIFDC\Tables). It is possible to change these default values for the preconfiguration of a device. To get new default values do a preconfiguration of a device or connect to a device with the desired parameter settings and select **Options > Save as Default.** This function stores the selected device database as the default database.

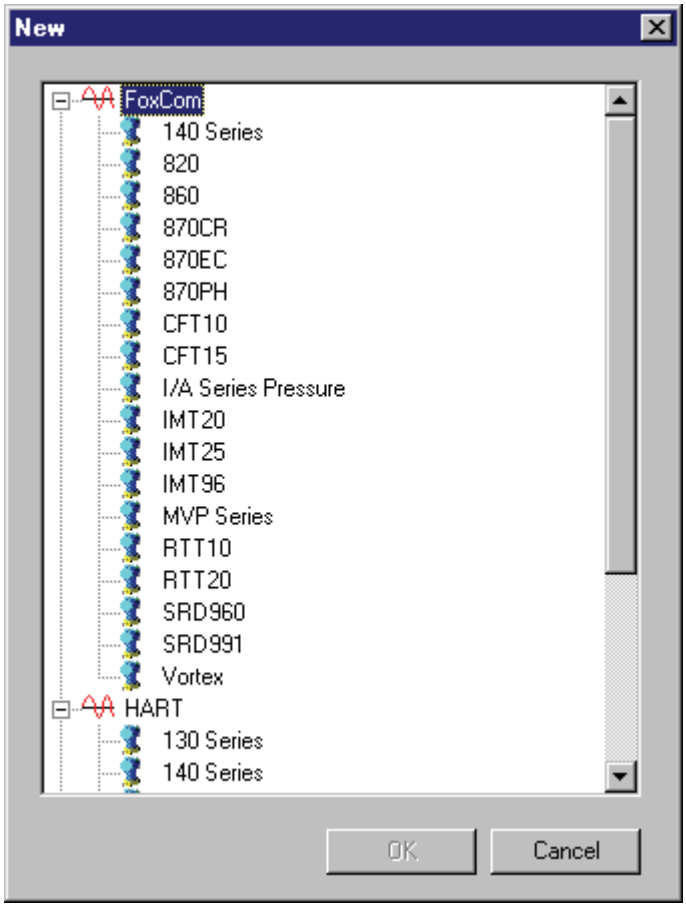


Figure 14. Device Type Selection Dialog Box

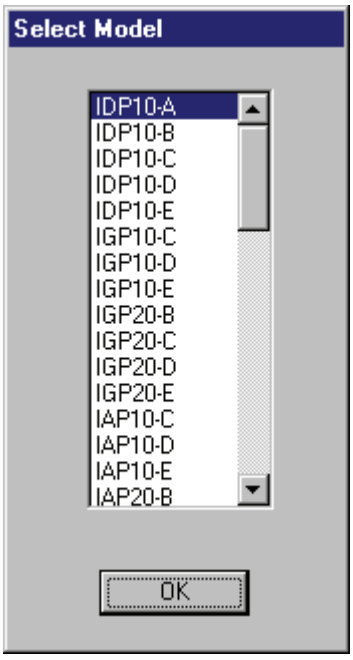


Figure 15. Model Selection Dialog Box

Device Selection and File Operations

A major difference between the IFDC I/A Series configuration and the PC20 configuration is the selection of devices and directories. With the PC20, connections are made to whatever device is on the wire. In the I/A Series configuration case, you must select the device. See Figure 16.

A more important distinction is for file operations. In the stand-alone case, file operations use standard Windows **File** menu **Open** and **Save** operations, using the standard file browsing dialog boxes. When connected to an I/A Series system, file operations are hard wired to specific directories for each device. Thus, the selection for the directory to save to, and the name of the file, is indirectly done by selecting a device from the available device list.

The following table describes the various file operations and their behaviors.

File Menu	PC20	IFDC
New...	Displays Device List. Brings up Configuration sheet.	Displays Device List. Brings up Configuration sheet.
Open ...	Brings up the standard Windows **Open** dialog box to open any database file.	Brings up the **Device Select** dialog box. The file select database specifies the directory where the file is located. The selected device block name is used as the filename. **New**... if the configuration file does not exist in the appropriate spot in the file system.
Close	Checks internal copy of the device parameters. If there are no changes, immediately closes the connection. Otherwise, asks if you wish to **Save to Device...**	Checks IFDC internal copy of the device parameters. If no changes, immediately closes the connection. Otherwise, asks if you wish to **Save to Device**.
Save	Saves all parameters to the existing filename. If saving a preconfiguration database, use **Save As...**	If compound and block names are known, saves the file. Otherwise, drop into **Save As...**
Save As ...	Saves the file to a different location or filename. The most popular filename is the user tag number.	Use **Select Device...** dialog box to find the device associated with the database. Use the directory path specified for the device and use the block name as the filename.
Connect to Device	Establishes communication to the device connected to the modem.	Brings up the **Device Select** dialog box. Then connects to the selected device.
Save to Device	If connected to a device, saves the new configuration information to the connected device. Otherwise, not available.	If connected to a device, saves the configuration information. Otherwise, not available.
Upload Database from Device	If connected to a device, restarts uploading the configuration database from the device again.	If connected to a device, restarts uploading the configuration database from the device again.

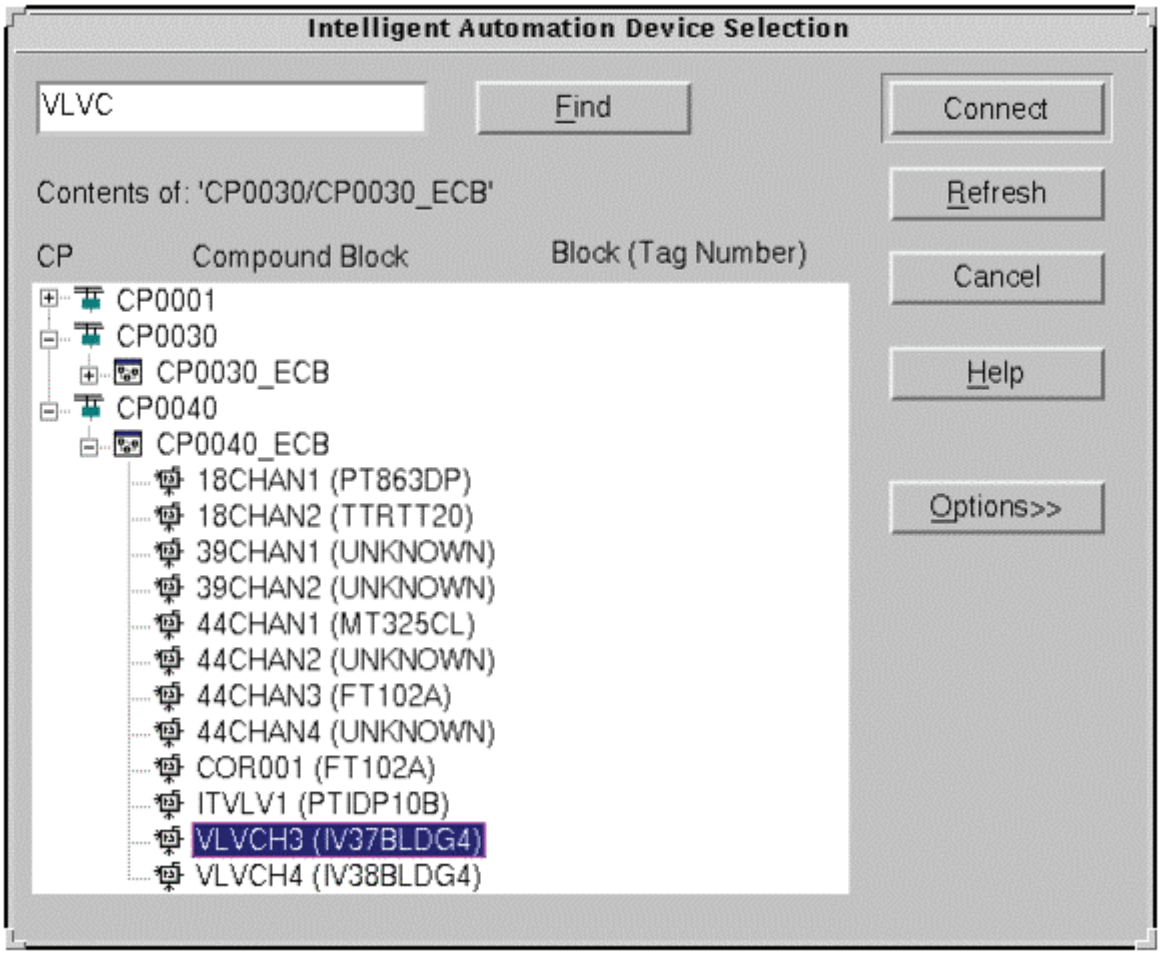


Figure 16. IFDC Device Selection Screen

The IFDC Device Selection screen as shown in Figure 16 displays the tag number of the device in parenthesis after the block name of the I/O channel. The tag number is a device parameter and stored in the device.

After pressing the **Refresh** button in the Device Selection screen, select the Control Stations in the next dialog box for which the displayed information should be refreshed. After the selection of one or more Control Stations, the IAUtil program initializes and creates the displayed tree information for the selected stations. The program uses the CSA and Object Manager services to retrieve the information about the blocks (compound and block name and tag number). Only I/O channels and blocks allowing connection of Intelligent Field Devices supported by IFDC (only certain ECB types) are filtered out. If a device is or was connected to the channel, the program retrieves the tag number from the corresponding ECB block via the Object Manager. The update of the tag number is only possible for FoxCom devices because those devices are supported by ECBs which hold the tag number information. For the HART devices, the ECB201 and ECB202 are used. This block does not hold the tag number and therefore CSA and Object Manager cannot retrieve the tag number. This means that during this initialization process only the tag numbers of FoxCom field devices are displayed. The other channels where HART devices are connected or preconfiguration (off-line) device databases are stored are marked as UNKNOWN.

The tag number of the device is updated in the displayed tree of the Device Selection screen through the following actions:

- After selecting the **Refresh** button as described above.
- After IFDC is connected with a device, IFDC retrieves the tag number from the device and updates the tree information for the Device Selection screen.
- After selecting **File > Save** or **Save As** in IFDC to store the field device database at a selected I/O channel, the tag number for the chosen channel is updated in the tree information of the Device Selection Screen. If the **Save** or **Save As** action is done from a Pre-Configuration window where no device is connected the tag number is marked at the end with an asterisk "*". A Pre-Configuration window is opened using **File > Open** or **New**.

NOTE

After system configuration changes (for example, after adding new Control Stations, FBMs and corresponding ECBs) the tree information within the Device Selection dialog boxes needs to be updated by selecting the **Refresh** button to make these ECBs visible in the Device Selection screen. But the **Refresh** button should only be used for new Control Stations because this function re initializes the tag number information and marks HART devices or preconfiguration (off-line) device databases as UNKNOWN.

Since some devices can only be associated with certain ECB types, the Device Selection dialog box supports the concept of filtering out invalid entries.

For ease of use, a search capability is provided in the Device Selection dialog box. When you type in a search string and press the Find button, the selection tree is searched for matching substrings. Once a substring is found, the specified tree item is selected and displayed. If the item is a parent item, it is expanded. Subsequent button presses on Find iterate to the next matching item.

IFDC Operation on Solaris with "windows off"

IFDC runs correctly on Solaris stations with "windows off". However, the **Edit > Configure** dialog tabs are inactive. Clicking the mouse on these tabs has no effect. In order to bring up the next configuration page, press the **CTRL** and **TAB** keys simultaneously. Note that this keyboard shortcut also works with "windows on". This keyboard shortcut does not work if IFDC is running on the secondary display in a dual-display system.

Preconfiguring a Device

The IFDC/PC20 enables you to preconfigure a device and save the configuration in your database for later downloading to a device. You can do this by beginning a new file (New in the File menu) or opening an existing file (**Open** in the **File** menu). When you begin a new file, you access a default database of the selected type of device. When you open an existing file, you access the database of a specific device which has been previously saved to this data directory. In either case, you can modify the database and then save it with the **Save As** function in the **File** menu. You can also (then or later) download the database to a device. To send a database to a device, the

database must be first saved to a file. Then you must connect to the device and select **File** and **Open** and then select the proper override.

Connecting to a Device

To connect to a device, first hardwire your device. For PC20, if this is done prior to startup, the configurator automatically connects to the device upon startup; if the device is connected after startup, select **Connect to Device** in the **File** menu. For IFDC, you must specify the device via the **Device Select** dialog box.

The IFDC/PC20 presents the Device Data screen (see Figure 18) and device top level menu (Figure 18) for the connected device. Also displayed is the device toolbar, which enables you to go to the configuration, various calibration, or status functions directly. These functions vary with each device. See Figure 17.

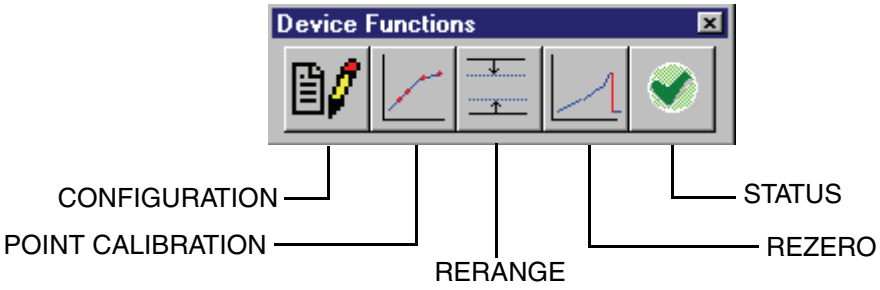


Figure 17. Sample Device Toolbar

Device Top Level Menu Screen

The device top level menu screen, shown in Figure 18, is displayed when connected to a device or when preconfiguration data is loaded onto a window. This screen also has pull-down menus for selecting the various functions. Explanations of the menus and functions that are common to most types of devices appear in Table 7.

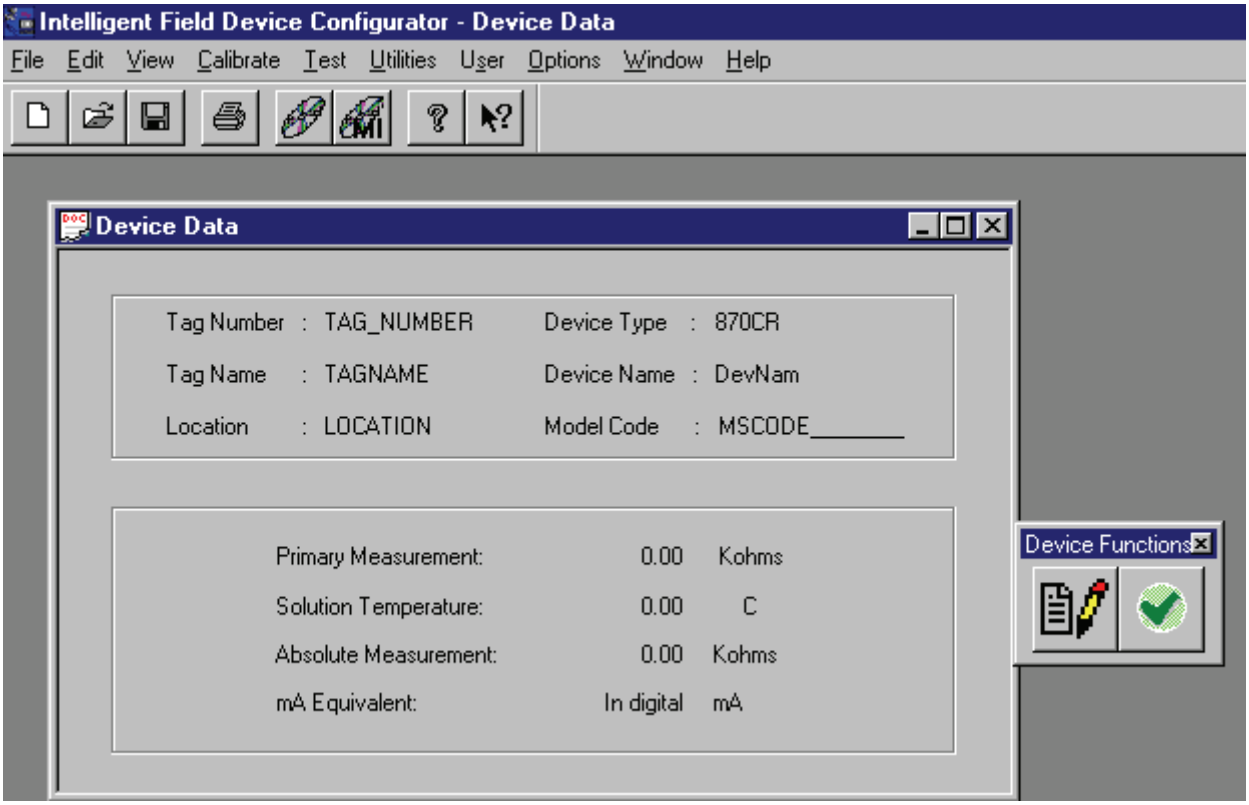

Intelligent Field Device Configurator - Device Data
File Edit View Calibrate Test Utilities User Options Window Help
Device Data
Tag Number : TAG_NUMBER
Device Type : 870CR
Tag Name : TAGNAME
Device Name : DevNam
Location : LOCATION
Model Code : MSCODE_____
Primary Measurement: 0.00 Kohms
Solution Temperature: 0.00 C
Absolute Measurement: 0.00 Kohms
mA Equivalent: In digital mA
Device Functions

Figure 18. Sample Device Top Level Menu and Data Screen

Table 7. Device Top Level Menu – Description of Functions

Top Level Menu Pick	Submenu Pick	Description
File	New Ctrl+N	Creates a preconfiguration database using a default database as a template.
	Open Ctrl+O	Edits an existing configuration database.
	Close	Closes the current configuration field.
	Save Ctrl+S	Saves the active document.
	Save As...	Saves the configuration to a file.
	Import	Imports the ASCII files generated by IFDC/PC20. See page 48.
	Export	Writes all the device parameters to an ASCII file which then can be imported into other programs. See page 48.
	Connect to Device	Connects to a device directly or using I/A Series Pass-Through. See page 41.
	Save To Device	Transfers configuration database to a device.
	Workshop Environment	Enables faster communication with optimized timing.
	Print... Ctrl+P	Prints the active document.
	Print Preview	Displays full pages.
	Print Setup...	Changes the printer and printing options.
	Print Font	Changes the print font.
	Print Full Database	Specifies printing the full database.
	(File Names)	Shows most recently accessed files for quick access.
	Exit	Quits the application; prompts to save documents.
Edit	Configure...	Edits the configuration database.
	Compare...	Against Database - Compares the current configuration against a stored database. See page 50.
		Against Device - Compares the current configuration against the values in the device. See page 50.
	Comments...	Allows you to view/edit comments regarding your device/configuration. The comments are stored in the database file only. They are not stored in the device. See page 50.

Table 7. Device Top Level Menu – Description of Functions (Continued)

Top Level Menu Pick	Submenu Pick	Description
View	Toolbar	Shows or hides the toolbar. See page 24.
	Device Toolbar	Enables you to go to the configuration, various calibration, or status functions directly. See page 41.
	Status Bar	Shows or hides the status bar. See page 25.
	Info Window	Shows device characteristic, audit trail, and error trace information. See page 26.
	Progress	Shows progress of an upload or download operation.
	Trend	Displays a trend. See page 45.
Calibrate	(Options vary with type of device)	- - -
Test	Device Status	Displays status and diagnostic information from the device. See page 51.
	Set mA/Pulse Output	If configured to 4-20 mA output, sets output to a specific mA value to test other devices in the loop. See page 53.
	Set Digital Output	If configured to Digital output, sets output to a specific digital value to test I/A Series system wiring and displays. See page 54.
	Display Raw Input	Displays raw inputs for some types of device. See page 54.
	Go Off-line	Places the device in Off-line mode. See page 55.
	Go On-Line	Places the device in On-line mode. See page 55.
	(Other options vary with type of device)	- - -
Utilities	FOX FLOW	Executes the FoxFlow application.
	CON VALVE	Executes the ConValve application.
	FOX DOC	Executes the FoxDoc application.
User	MS Word	Executes MS Word.
	MS Excel	Executes MS Excel.
	Run ...	Runs any program.
	(User Application 1)	Launches a user-specified application.
	(User Application 2)	Launches a user-specified application.
	(User Application n)	Launches a user-specified application.
Options	Settings	Modifies application settings. See page 30.
	User ...	Defines up to nine user applications to add to **User** menu.
	Save as Default	Saves the current configuration as the default template for **File > New**.
	Change Security Level	Provides password access.

Table 7. Device Top Level Menu – Description of Functions (Continued)

Top Level Menu Pick	Submenu Pick	Description
Window	New window	Opens another window for the active document.
	Cascade	Arranges windows so they overlap.
	Tile	Arranges windows as nonoverlapping tiles.
	Arrange icons	Arranges icons at the bottom of the window.
Help	Index	Lists Help topics.
	Using Help	Displays instructions about how to use Help.
	About	Displays the software version number of the configurator.

Workshop Environment

Workshop Environment enables faster communication with optimized timing. It is accessed via the **File** menu from the device top level menu. Do **not** use this function when the PC20 is connected in parallel to another configurator or to an I/A Series FBM. If you have communication problems while using this function, switch it off by selecting the menu item again.

Trend Dialog Box

Trend dialog box is accessed via the **View** menu from the device top level menu.

The Trend dialog box displays important measurement data of a device. The measurement data are dynamically retrieved from the device and displayed. The trending is only active as long as this dialog is displayed and the **Monitor** checkbox is checked. The trend dialog box is resizeable.

Save Trend Data

With Save Data it is possible to store the measured trending data collected since the trend dialog box is displayed and the **Monitor** checkbox is checked. You are asked for the path and filename to store the trending database. This file could be displayed at later time by using the **Load Data** button.

Load Trend Data

With **Load Data** it is possible to retrieve the stored trending database. You are asked for the path and filename to retrieve the trending database. The file must be written using **Save Data**.

Clear Trend Data

With **Clear Data** it is possible to delete all the collected trending data until this point and start trending with a new database. The previously collected trending data is lost unless it is stored for later use by using **Save Data**.

Print Trend Data

With **Print** the displayed portion of the trending view can be printed. Before this step, it is possible to choose the portion of the trend data which you want to display and print by using the functions to Manipulate the Scales or to Manipulate the Trend.

Monitor Trend Data

With the **Monitor** check box being checked, the dynamically retrieved data are collected within the trend dialog box and displayed. If this box is unchecked, the collection of the measurement data is switched off.

Export Trend Data

With **Export Data** it is possible to store the measured trending data collected since the Trend dialog box is displayed and the **Monitor** checkbox is checked into an ASCII text file. You are asked for the path and filename to store the trending database. The default filename is composed of the Tag Number + _TRD.txt. However, you can choose any other name.

The trend file has a header part and the trend data part with the curve values. The header part contains information such as the tagname, number of curves as well as ranges and descriptions of the curves. The trend data part lists in each line the measured values for each curve. Each measurement shows the sequence number, date (Month/Day/Year) and time (Hour:Minutes:Seconds.Milliseconds) of measurement and the values for each curve. To import the trend data into other programs, select the appropriate ASCII import function within the other program.

Example for Microsoft Excel

In Microsoft Excel, choose **File > Open**. For the file type, select **Text Files** to list all files and select the desired file with the ending **_TRD.txt**. The Excel Import Assistant will guide you through the definition of the import format:

Start the import with the headings for the curves (line number 13).

The fields are separated by tabs.

Select **General** for all columns.

Import the file.

It is now possible to use the Excel functions and store this file in the Excel format.

The imported information will be displayed in several columns. For each measurement you have a row. The first column contains the measurement number followed by the date and time. Beginning with the fourth column the measured curve values are displayed.

Example for Microsoft Access

In Microsoft Access, open your database. Choose **File > External Data > Import**. For the file type, select **Text File** and select the desired file with the ending **_TRD.txt**. The Access Import Assistant guides you through the definition of the import format:

The fields are separated by tabs.

Import the file.

The imported information is displayed in several columns. For each measurement you have a row. The first column contains the measurement number followed by the date and time. Beginning with the fourth column, the measured curve values are displayed.

Save as Default

Save as Default saves the current configuration as the default template for **File > New.** The default templates are stored in the subdirectory tables:

C:\Program Files\Foxboro\FoxIFDC\tables

If you changed the default template of a device and you want to restore the initial default template, copy the appropriate template file of a device with the extension **DAT** from the directory **C:\Program Files\Foxboro\FoxIFDC**. The template files are composed of the following strings: **def** + device type + **_H** (for HART only) and the extension **DAT**.

Reading Device Data

When the IFDC/PC20 is connected to a device via **File** > **Connect to Device**, the device top level menu and Device Data screen is presented. This screen identifies the device and continuously reads and displays measurement information from the device, as shown in Figure 18. Measurements are updated approximately once every two seconds. The display also shows additional information as follows:

- Measurement values are displayed in red if the specific measurement is out of range or the device reports an alarm for this measurement.
- Measurement values are displayed in cyan if the value is not secure (not current) and the last retrieved value is displayed. All measured values are cyan if there are communication problems.
- Measurements are replaced by asterisks (*) if a communication error occurs during initialization or reinstallation steps.
- Dashes indicate off-line status.
- Number signs indicate that these is an invalid measurement.

Downloading Database Information to a Device

CAUTION

Before using this function, it is **highly recommended** that you save the existing device data in your database. Since the factory does not maintain the databases on every device shipped, overwriting the original coefficients with different values can result in permanent loss of the accuracy and repeatability resulting from factory calibration.

To download working database information to a device:

1. Hardwire your device to the FBM or Fieldbus (for IFDC) or to the modem, FBM, and/or optional power supply unit (for PC20).
2. Access **Connect to Device** via the **File** menu.

3. Open the desired file via **File > Open**.
4. Select one of the override choices.
5. Respond **Yes** when asked if you want to download the database to the device.

ASCII Format for Import and Export

The IFDC/PC20 ASCII format file contains two sections:

- File header
- Parameter list.

File Header

The file header identifies:

- The version of the file format
- The device type
- The major and minor revision level of the firmware of the documented device
- The database type (normally the database type is 0 for import or export files)
- The date and time of creation of the file
- Comments. (comments can be added to the IFDC/PC20 database by accessing the menu item **Edit > Comment**).

Parameter List

The Parameter List starts with BEGIN_INPUT, and ends with END_INPUT.

There is one parameter per line. The description includes the name of the parameter and then its value. The two items are separated by a comma.

The name of a parameter is a short key identifier string. The name is unique for one device.

The value of a parameter is written as ASCII strings. Strings are not surrounded by quotation marks (“or”). The string starts after the comma and ends at the end of the line or at the beginning of a comment.

Comments

The comment starts with the string **,/*** (comma, slash, asterisk). Everything between this string until the end of the line belongs to the comment.

IFDC/PC20 Export - Format

The IFDC/PC20 Export function contains all parameter/value pairs of a device. Do **not** rely on any order (sorting) of the parameters.

During the Export function, each parameter/value pair is followed by a comment which describes the parameter.

You can choose any filename for the export file.

IFDC/PC20 Import - Format

An ASCII file which is imported by IFDC/PC20 does **not** need to have a certain filename. The format of the file, however, needs to have the structure described above.

To import an ASCII file you need to open a device database or connect to a device of the same type.

The import file does not need to contain all parameters of a device. It is possible to import only certain parameters. The parameters are identified by their names. The parameters do not need to have a specific order (sorting).

For the import, the comment part describing the parameter in each line is not needed. But it is possible to add comments at any place.

— NOTE

Use the import function only with files generated by IFDC/PC20 for the same device. Do not change the exported files. The import function does not check and validate the consistency of any parameter. Changing an exported file and downloading this parameter to a device may damage the device configuration.

Example of the IFDC/PC20 - ASCII Format

An example of the format follows:

```
//* Foxboro Corporation
//* IFDC/PC20
File Version: 5
Transmitter Type (converted) / Subtype: 16 / 10
Firmware Major Revision: 0
Firmware Minor Revision: 5
Database Type: 2
Date: 02/08/2000  14:00
Comment:
,/*
BEGIN_INPUT,
TAGNME, Level Device  ,/*Tag Descriptor
LOCATE, Location 1    ,/*Geo Location
SENPLT, (0a) 144LVD,/*Sensor Type Code
SENTYP, 25 ,/*Transmitter Type #
TAGNMB, 144LVD      ,/*Tag
MANUFID, (3f) Foxboro Eckardt,/*Manufacture ID
HDWRREV, 03 ,/*Hard Rev
DEVID, 9300361,/*Device ID Number
TAGDATE, 09/22/1999,/*Tag Date
.........................
END_INPUT,
```

Configuration Function

The Configuration function allows editing of the device database. This function is accessed via the **Edit** menu from the device top level menu or from the device toolbar. The **Configure** menu contains those configurable parameters applicable to a specific product. Therefore, the menu differs from product to product. Information on each configuration operation and how to accomplish the configuration is given in the appropriate product appendix.

Compare Function

The Compare function allows you to compare values of various device parameters in the working database with those in the device or those in a stored database file. The Compare function is accessed via the **Edit** menu from the device top level menu. A sample of a compare screen is shown in Figure 19. All parameters, whose values are different, are highlighted.

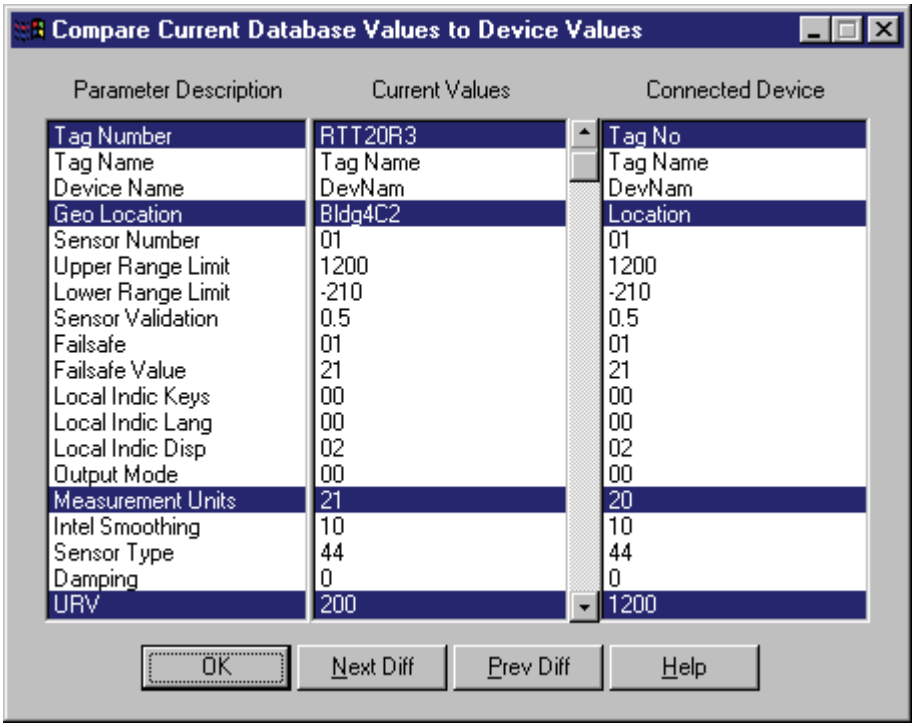


Figure 19. Sample Compare Screen

The Compare function may be used as shown in Table 8.

Table 8. Compare Function Possibilities

Active Database/Device Connection Status	Compare Against File	Compare Against Device
Preconfiguration file open only. No device connected.	Yes	No
Connected device uploaded database, edited or unedited device connected.	Yes	Yes
Preconfiguration file open and device connected (same type).	Yes	No
Existing database on file opened and device connected.	Yes	No

Comments Function

The Comments function allows you to record comments regarding your device/configuration. You can use it to add comments to the data file, view comments already written, or copy the

comments to another data file. The Comments function is accessed via the **Edit** menu from the device top level menu. The Add Comments screen is shown in Figure 20.

NOTE

Comments are stored in the IFDC/PC20 database file and are not stored in the device's memory.

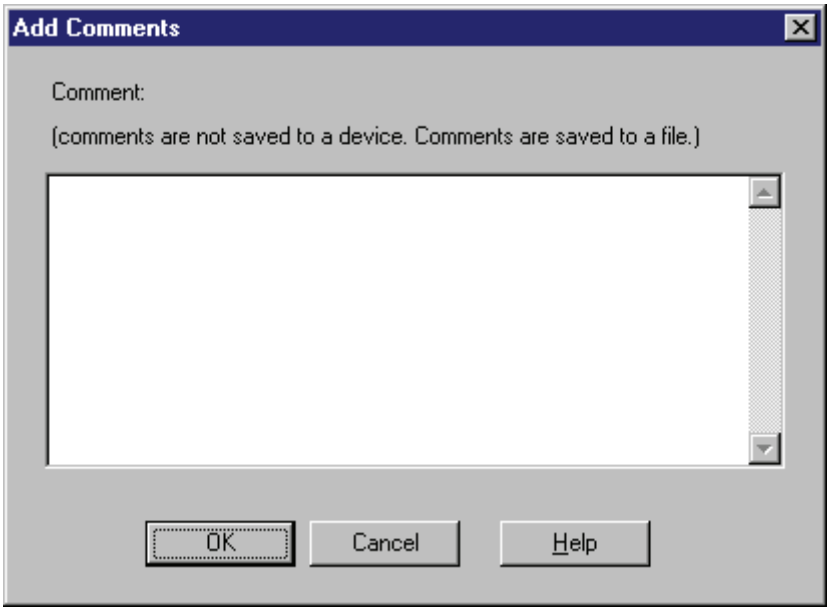


Figure 20. Comments Screen

Calibration Function

The Calibration function is accessed via the **Calibrate** menu from the device top level menu. The **Calibrate** menu contains those calibration operations applicable to the specific device you are calibrating. Therefore, it differs from product to product. Information on each calibration operation and how to accomplish it is given in the appropriate product appendix.

Field Device Status Function

The Field Device Status function interrogates the connected device and displays Pass-Fail status messages on the Primary and Secondary Status Fields and an alphanumeric indication of any diagnostic errors. The function is accessed via the **Test** menu from the device top level menu. A sample Field Device Status screen is shown in Figure 21.

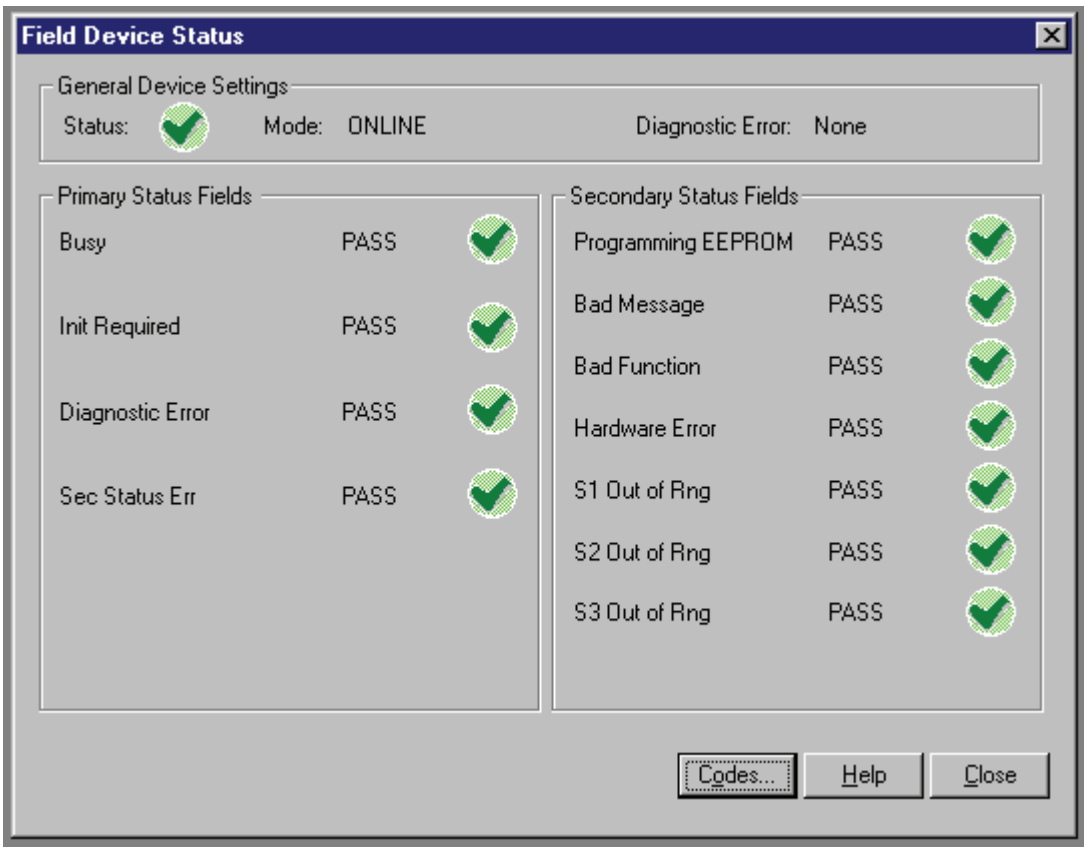


Figure 21. Sample Field Device Status Screen

The Field Device Status screen is only applicable to the specific product to which you are connected. Therefore, it differs from product to product. The list of device status messages, their explanations, and recommended actions are given in the appropriate product appendix.

Selecting **Codes** at the bottom of the display causes the various diagnostic codes to be displayed in decimal and hex form with no text translation. A sample Diagnostic Codes screen is shown in Figure 22.

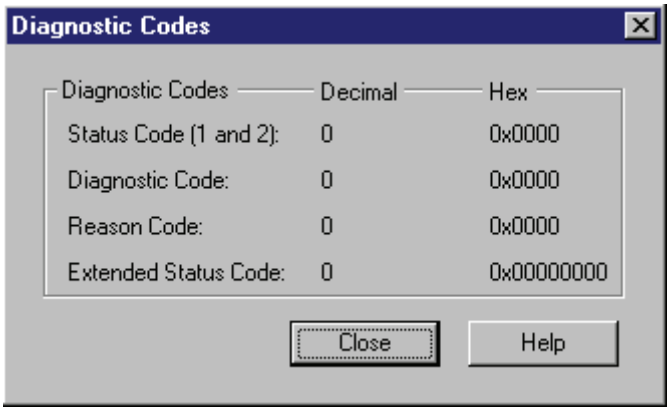


Figure 22. Sample Diagnostic Codes Screen

The Diagnostic Codes list shown is only applicable to the specific product to which you are connected. Therefore, it differs from product to product. The list of device diagnostic error codes, their explanations, and recommended actions are given in the appropriate product appendix.

Set Update Time Function

In PC20, this function allows you to modify the dynamic measurement scan time. Per default, the sleep time between dynamic measurement cycles (T1s) is 2000 ms. The resulting cycle time (T1c) is the sum of the sleep time (T1s) plus the retrieve time to retrieve the dynamic measurement values (T1r). Therefore, T1c = T1s + T1r. The retrieve time (T1r) depends on the protocol and the number of retrieved values. The sleep time (T1s) can be changed with this function. For some devices, there is a secondary measurement cycle (as a multiple of the first primary cycle) in which the values, which do not change so frequently, are collected. For example, in the SRD991, the measurement of the internal temperature, cycle count, and travel sum is in this second cycle. The multiplication factor (Y) for this cycle can also be changed. The resulting secondary cycle time (T2c) depends on the primary cycle and the retrieve time (T2r) for the secondary values. Therefore, T2c = Y (T1c) + T2r.

— NOTE

This function is only allowed in the workshop/workbench environment. Do **not** change these parameters if PC20 is connected to a device in parallel to the FBM.

Set mA/Pulse Output Function (Loop Cal)

When Output is configured 4-20 mA, certain devices can be set to output a mA value to test or adjust other devices in the loop. The Set mA/Pulse Output function is accessed via the **Test** menu from the device top level menu. To set the mA output, first select the output units (in mA, measurement units, or %) and then enter the desired output value. The Set mA/Pulse screen (Figure 23) shows the allowable output range and units.

If you are using a CFT10 or CFT15 transmitter, you can select to set either the mA or pulse output to a desired value.

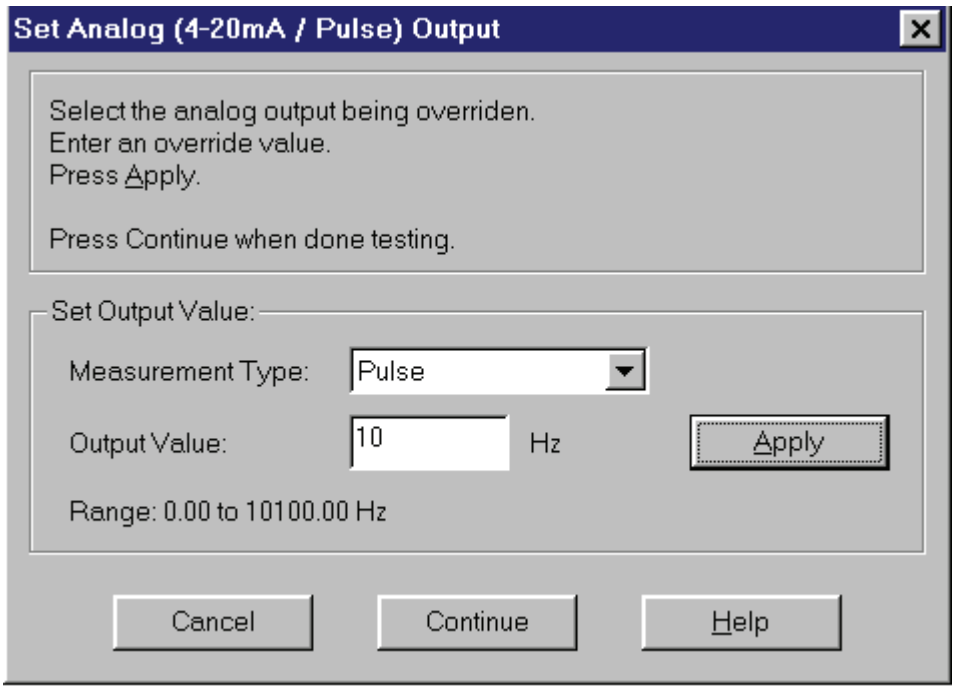


Figure 23. Sample Set mA/Pulse Screen

Set Digital Output Function

When a device is configured for FoxCom Digital Output, certain devices can be set to output a digital value to test I/A Series system wiring and displays. (I/A Series Version 4.0 or later is required.) Both Measurement #1 and Measurement #2 outputs can be set. The Set Digital Output function is accessed via the **Test** menu from the device top level menu. First, select the measurement and then enter the desired output value.

Display Raw Input Function

This function reads the raw inputs for certain devices. The Display Raw Input function is accessed via the **Test** menu from the device top level menu. The inputs displayed for various devices are shown in Table 9.

Table 9. Raw Inputs Displayed for Various Devices

Device Type	Display
820	Frequency of Input 1 (pressure input) Frequency of Input 2 (temperature input)
860	mV Input 1 (pressure input) mV Input 2 (temperature input)
I/A Series Pressure	mV Input 1 (pressure input) mV Input 2 (temperature input)
CFT10	Tube Drive Frequency
CFT15	Tube Drive Frequency

Table 9. Raw Inputs Displayed for Various Devices (Continued)

Device Type	Display
83	Shedding Frequency Upper Limit Frequency
IMT25	Electrode Voltage (Positive) Electrode Voltage (Negative) Coil Current (Positive) Coil Current (Negative)
IMT96	FlowB ADC counts compensated for offsets Voltage reference in ADC counts for offsets Actual gain calculation Zero flow offset
130	Pressure input (in percent)
140	Pressure input (in percent)

Go On-Line Function

All functions normally return to on-line status unless the device was disconnected during operation. However, this function enables you to force the device back to on-line mode if necessary. The Go On-Line function is accessed via the **Test** menu from the device top level menu.

Go Off-Line Function

Normally, the device should remain on-line. However, this function enables you to force the device off-line if necessary. The Go Off-line function is accessed via the **Test** menu from the device top level menu.

Help Function

Help Menu

In the **Help** menu you can choose to display a list of Help topics (Index), display overview instructions IFDC/PC20 (Using Help), or display the version number of the configurator (About). If you choose **Index**, you can select information on a specific menu. To search for a topic or choose from the list of available topics, select the **Index** tab from this screen (see Figure 24). To search for a word or phrase that may be contained in a Help topic, select the **Find** tab from this screen.

Help Via the Toolbar

The "**?**" icon on the toolbar provides an easy way of accessing the **About** Help described above. The "↖**?**" icon can be used to get information on the subject you designate with the indicator. To do this:

1. Click on the "↖**?**" icon.
2. Move the mouse pointer to the area in which you want Help.

3. Click again to display the Help message for that particular item.

Help Via the F1 Function Key

Help is also available on any subject identified by the placement of your cursor when pressing the **F1** function key.

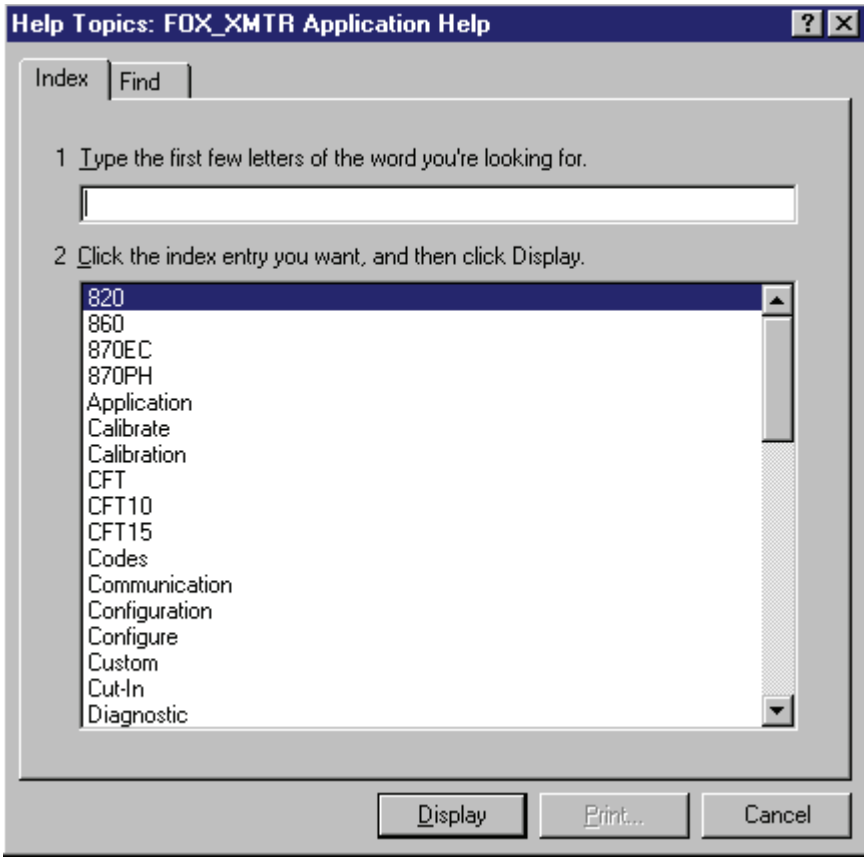


Figure 24. Help Topics Index Screen - Index Tab

Previewing or Printing a Device Database Report

This function permits you to preview a device database report or output it to a printer. To perform this function, first access the data by connecting to the device or accessing the database via **Open** in the **File** menu. Then use the **Print Preview** or **Print** option in the **File** menu. To preview or print the full database rather than just the configuration parameters, specify **Print Full Database** in the **File** menu prior to specifying **Print Preview** or **Print**.

IFDC Printing on Station with Solaris Operating System

Print Setup

The I/A Series system is shipped with a default WIND/U® file which is read by WIND/U applications. This file is used to store printer settings as well as other user preferences. The default print settings must be supplied to the WIND/U XPrinter application before any WIND/U

application can use Print Preview or perform any printing. Therefore, you must invoke the application's Print Setup to provide the default printer information before any printing can be done.

To invoke the application Print Setup:

1. Click **File > Print Setup** and select the **Properties** button.

   The dialog box which appears has a button on the bottom labeled **Install...**.

   Click on **Install....**

   A dialog box appears where you can add or delete printers. Note that the first time this dialog box appears, there are no configured printers.

2. Click on **Add Printer.**

   A dialog box displays all valid printer types and all currently configured ports. The first time this dialog box is invoked, the only port is **FILE:**.

3. Click on **Define New Port**.

4. In the dialog box, select **Spooler** to let XPrinter go out and supply all configured printers on your system.

   This dialog box allows you to click on a port and edit the print command supplied if you wish to do so.

5. Dismiss this dialog box.

   Notice that all the printer ports now appear in the **Add Printer** dialog box.

6. Click on a port, then scroll down and select the appropriate printer type from the long list on the left. Note that only PostScript® and PCL™ printers are available.

7. Select the printer type, click on **Add Selected** to provide that printer in the actual Print dialog box application.

8. Dismiss this dialog box and the Printer Installation dialog box.

9. In the Printer Setup dialog box, click **Save**.

10. You must select the correct printer type. If the type of printer you have does not appear in the printer type list, try **Generic PostScript Printer**. If that does not work, you must install the printer-specific description file. Printer description files (PPD files) are available from the printer manufacturer, and some printer manufacturers allow the printer description files to be downloaded from their web page. For example, Hewlett-Packard™ provides all their printer description files on their Customer Service web page, *http://www.hp.com/cposupport/eschrome.html.*

11. Select **Printers** from the pull-down menu, click on **Next** and follow the directions provided on the screen.

    The Windows version of the PPD file is the correct one. Adobe also provides a number of printer description files for a number of different printers (*http://www.adobe.com/prodindex/printerdrivers/installwinppd.html*).

To install a new printer PPD file:

1. Exit any running IFDC, FoxDraw, or I/A Series SFC application.

2. Rename the PPD file. The PPD filename must be lowercase. For example, **HP1600C1.PPD** must be renamed **hp1600c1.ppd**.
3. Change the file extension. If the printer is a PostScript printer, the filename must be **<filename>.ps**. If the printer is a PCL printer, the filename must be **<file-name>.pcl**.
4. Install the file in the **/opt/windu/xprinter/ppds/** directory.

   Once the new printer driver file is installed, XPrinter reads the file and the Print Setup Printer Type list now includes the new printer type.

Print Font

This selection allows you to select the print font and font size. The first time Print Font is entered, the default font size may be blank or have an invalid numeric value. Select the desired font and size.

Print Preview

When the station is connected to a device or is used to preconfigure a device, a device database report is available. **Print Preview** provides a window which displays what the actual printed report looks like.

The one item to note in **Print Preview** is that the font size, if set too big, causes only part of the report to be visible on a given page. If the selected font size is the smallest size provided for the selected font, then the only way to scale the font further is to invoke Print Setup and set the Scale to a smaller value. For example, if the default font is Times and the font size is 8, a print setup scale of 0.05 allows a 2-column report per page.

IFDC Printing on Station with Windows Operating System

Due to the nature of the Windows operating system, a printer connected to the I/A Series Nodebus via a communications processor is not accessible from Windows applications. Therefore, to print IFDC database reports, the Windows based station must have a printer connected directly to the Windows based station parallel port, and this must be the printer used. Another option is to print the IFDC database reports to a file, then transfer the report file to a diskette and take it to a Windows PC which has a printer directly connected, and print the report file on that PC.

Profibus Configuration (PC20 only)

For Profibus devices, the **File > Connect to Device** does not work the first time. Before it is possible to connect to a Profibus slave device, it is necessary to go though the following steps:

- Define the Profibus Master parameters in the Masters page.
- Define the Profibus Slaves in the Slaves page.
- Create a connection to the slave by selecting the **Connect** button in the **Slaves** page.

The definitions about the Profibus master and slaves are stored in a file with the extension .PBC. The Profibus configuration is stored in this file if you press the **Save** button in the **Master** page

or press the **Connect** button in the **Slaves** page or if you leave the Profibus Configuration dialog box with the **OK** button. If you close down PC20 and start it later again, the Profibus configuration you saved last is used.

It is possible to store different Profibus configurations in different files with the **Save** button in the **Master** page. With the **Open** button, it is possible to read in another Profibus configuration.

After you created a connection to a Profibus slave by selecting the **Connect** button in the **Slaves** page, the menu selection **File > Connect to Device** works. It connects to the same slave you selected last time in the **Slaves** page. If you want to connect to a different slave on the Profibus you need to go back to the **Slaves** page, select the slave and press **Connect**.

Profibus Master Page

In the **Master** page, the Profibus parameters for the Profibus master stack must be configured.

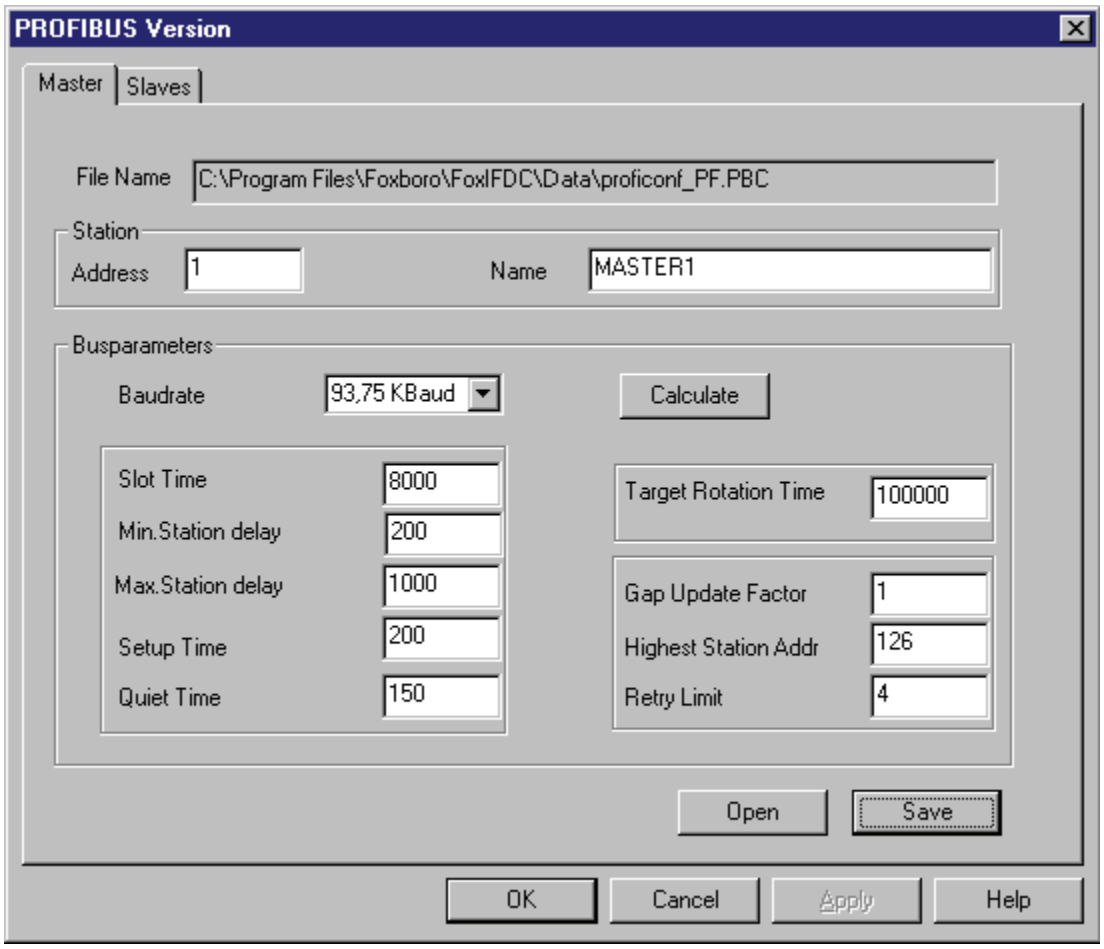


Figure 25. Sample Profibus Master Configuration Screen

Table 10. Profibus Master Configuration Screen – Field Descriptions

Input Field	Range	Unit	Description	Notes on user input
File Name			The field displays the path and filename of the Profibus configuration file. The file has the extension .PBC.	To change the path and filename for the Profibus configuration file, press the **Save** button. The File dialog box is displayed and allows you to change the path and filename. Or with the **Open** button another Profibus configuration file can be selected.
Station Address	1...126		Address of the Profibus Master	The user must engineer this bus parameter.
Station Name			Name of the Profibus Master	The user must engineer this bus parameter.
Baud rate	9.6 KBaud, 19.2 KBaud, 93.75 KBaud, 187.5 KBaud, 500 KBaud, 1.5 MBaud, 3 MBaud, 6 MBaud, 12 MBaud, 45.45 KBaud		Baud rate of the Profibus Segment	The user selects the Baud rate in the combo box (Note 1).
Slot time	37... 16383	Tbit (Note 2)	The Slot time specifies the maximum time the master waits for a transaction response.	The user must engineer this bus parameter. The value is depending on the baud rate (Note 3).
Min. Station Delay	11...1023	Tbit	The min. station delay response time defines the minimum time to wait before generating a reply frame.	The user must engineer this bus parameter.
Max. Station Delay	35...1023	Tbit	The max. station delay response time defines the maximum time to wait before generating a reply frame.	The user must engineer this bus parameter.
Setup time	1...279	Tbit	The Setup Time defines the time between an event (for example, timer interrupt) and the necessary reaction (for example, enabling receiver).	The user must engineer this bus parameter.

Table 10. Profibus Master Configuration Screen – Field Descriptions (Continued)

Input Field	Range	Unit	Description	Notes on user input
Quiet Time	0...127	Tbit	The Quiet Time specifies the time a transmitting station must wait after the end of a frame before enabling its receiver.	The user must engineer this bus parameter.
Target Rotation Time	256... 16777 215	Tbit	The Target rotation time defines the anticipated time for one token round on the Profibus, including allowances for high and low priority transactions, errors and GAP maintenance.	The user must engineer this bus parameter (Note 4).
Gap Update Factor	1...255		The Gap update factor specifies the number of token rounds between GAP maintenance (update) cycles.	The user must engineer this bus parameter.
Highest Station Addr.	1...125		Highest slave device address.	The user must engineer this bus parameter.
Retry Limit	0...7		Max retry limit.	The user must engineer this bus parameter.

NOTE

1. If you press the Calculate button, the system calculates suggestions for those parameters which depend on the selected baud rate. Of course, you need to adapt the suggested parameter values to your needs.
2. The unit for the times calculated is TBit (Bit Time), which means a time, based on one bit to transmit with a certain baud rate; for example, 1 TBit at 12 Mbaud = 1/12,000,000 bit/sec = 83 nsec.
3. Refer to the Profibus Specification: TSL = max (TSL1, TSL2), TSL1 = 2*TTD + maxTSDR + 11 bit + TSM, TSL2 = 2*TTD + maxTID1 + 11 bit + TSM, Transmission Delay Time TTD = tTD / tBit.
4. Refer to the Profibus Specification: min TTR = na * (TTC + high TMC) + k * low TMC + mt + RET TMC, where na: number of master stations; k: estimated number of low priority message cycles per token rotation; TTC: token cycle time; TMC: message cycle time, depending on frame lengt;, mt: number of message retry cycles per token rotation; RET TMC: message retry cycle time.

Profibus Slave Page

In the Profibus **Slaves** page, you can define all slaves connected to the Profibus master.

For each slave to which you want to connect, define:

- The slave address

- The name of the slave. The name is only for internal use and helps you identify the different slaves.

Table 11. Profibus Slave Page – Actions

Action	Description
Add	To define a new slave, enter the address and name of the slave device on the right side and press **Add**. The new slave is added to the list of slaves in the list box.
Modify	To modify the information of a slave, select the slave in the list box, edit the address or name in the edit controls on the right side and press **Modify**.
Delete	To delete a slave, select the slave in the list box and press **Delete**.
Connect	To connect to a certain device, select the slave device with the appropriate slave address in the slave list and press the **Connect** button. The program leaves the configuration dialog box and connects to the selected device. From now on PC20 will connect to this device with the menu selection **File > Connect to Device**. If you want to connect to a different slave enter the Profibus Configuration dialog box again and select another slave.

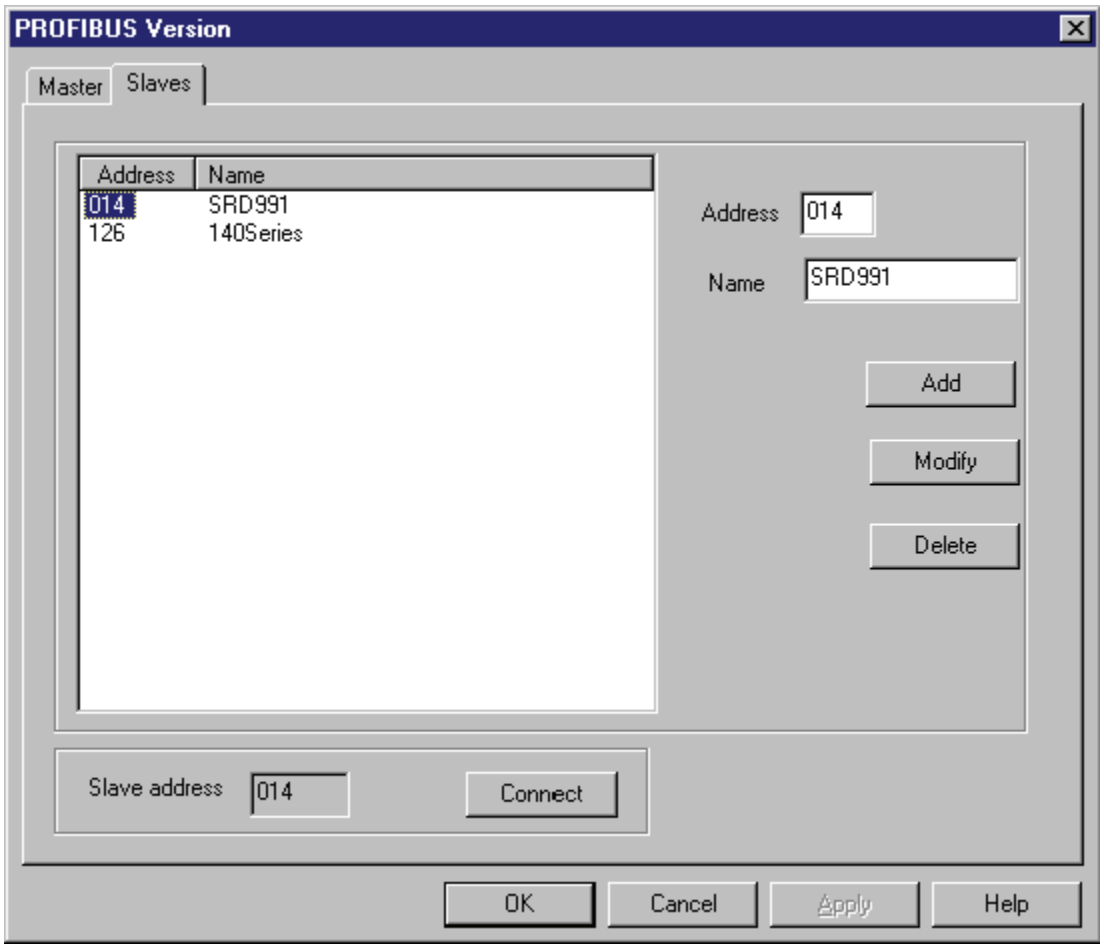


Figure 26. Sample Profibus Slave Configuration Screen

4. Troubleshooting

NOTE

For IFDC, check the latest *Intelligent Field Device Configurator (IFDC) Release Notes* (B0400QL) for the list of known problems.

IFDC/PC20 Error Messages

If a problem occurs during IFDC/PC20 operation, an error message is usually displayed that can help you localize the fault and take appropriate action. If this does not work, use the following general troubleshooting procedure and the flowcharts in Figure 27 or Figure 28:

1. Check the loop wiring and verify that power is present on all devices and that all devices are connected properly.
2. Check the LEDs on the FoxCom modem to determine the modem status. When the Listen light is on, the modem is in the receive mode, ready to accept incoming data. When the IFDC/PC20 attempts to communicate with the device, the modem is in the Send mode and the Talk light blinks on and off. If the Listen light is not on, make sure you are set to the correct communication port.
3. To determine whether the problem is a communication failure, a computer failure, or a device failure, substitute an HHT for the computer and see if the problem persists.
4. If the computer is OK and communication is OK, use the IFDC Test - Diagnostic functions to check device status. If a FAIL condition is present, take action to correct that condition.
5. If the device, communication system, and computer are OK, check the IFDC software. Verify that all files reside in the specified directories. If this does not identify the problem, try reloading the IFDC software and/or restoring database files from your backup.
6. If all else fails, contact the Customer Satisfaction Center (CSC) at 1-866-746-6477. When calling, please have available all pertinent information about your PC (processor type, speed, RAM, disk size, and so forth), your module software version, and a description of your problem. It is also helpful if your PC is running IFDC at the time you call.
7. If Invensys Foxboro service asks you to send a trace file, generate a trace file as described below and send it to Invensys Foxboro service per e-mail.

Device Status Error Messages

Status error messages, explanations, and recommended actions for various device types are located in the applicable appendix.

Device Diagnostic Error Messages

Diagnostic error codes, error messages, and recommended actions for various device types are located in the applicable appendix.

PC20 Trace Function

PC20 has a trace function which helps Foxboro service locate any problems. After a normal installation, the trace function is switched off. If you are asked to enable tracing, do the following:

1. Select **Start > Run** and enter the program name of the registry editor: **regedit** or **regedt32**.
2. Select the folder **HKEY_LOCAL_MACHINE\SOFTWARE\Foxboro\FoxIFDC**.
3. Select the entry **ITCDEBUG**.
4. With the right mouse click you are able to modify the value. Set the value for **ITCDEBUG** on 2 (Trace Debug = 2, No Debug = 0).
5. Now start PC20, reproduce the problem, and exit PC20.

PC20 generates a file **output.txt** in the directory **C:\Program Files\Foxboro\FoxIFDC**.

IFDC Trace Function

IFDC has a trace function which helps Foxboro service locate any problems. After a normal installation, the trace function is switched off. If you are asked to enable tracing do the following:

On stations with the Solaris operating system:

1. Open a VT100 window or cmdtool.
2. Move to the IFDC directory:
   cd /opt/fox/ciocfg/ifdenv
3. Create a file named **IFDC_Trace**:
   ls -las > IFDC_Trace

On stations with the Windows operating system:

1. Select **Start > Programs > Command Prompt**.
2. In the command prompt window, move to the IFDC directory:
   d:
   cd opt\fox\ciocfg\ifdenv
3. Type **sh** and press the **return** key to enter a NuTCRACKER™ Korn Shell.
4. Create a file named **IFDC_Trace**:
   ls -las > IFDC_Trace

Invoke IFDC the same way as before. Run IFDC and reproduce any problem you want to trace.

The trace function generates logfiles which are all written into the directory **/opt/fox/ciocfg/ifdenv: ifdc_startup.log, pt_api.log, om_api.log and output.txt**

Send these trace files and the IFDC_Trace file to Invensys Foxboro service.

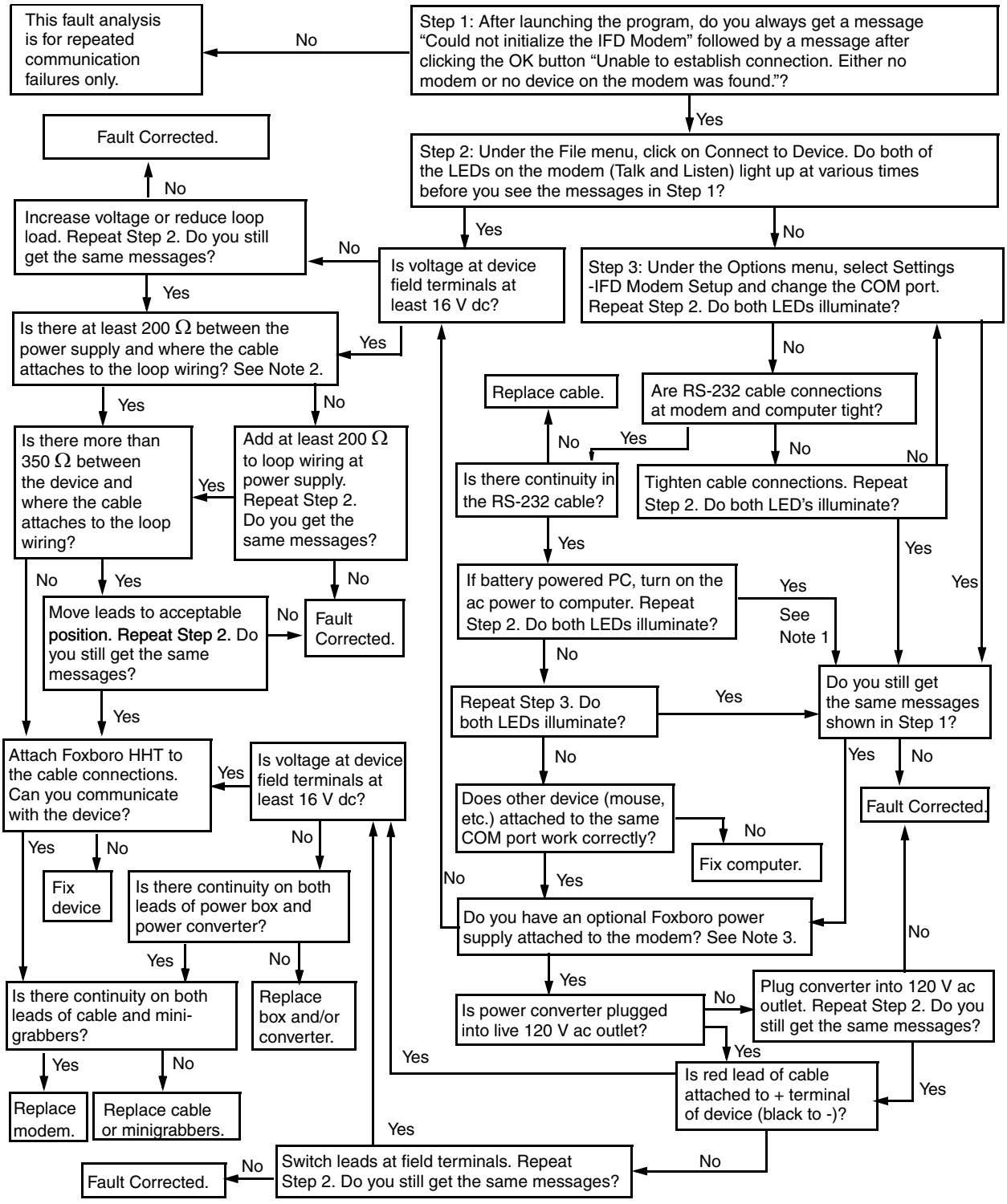
CAUTION

For the trace function you need enough disk space on the /opt partition to generate the trace files.

After the trace files are generated, the trace function should be switched off by deleting the file IFDC_Trace.

PC20 Fault Analysis of Communication Failures

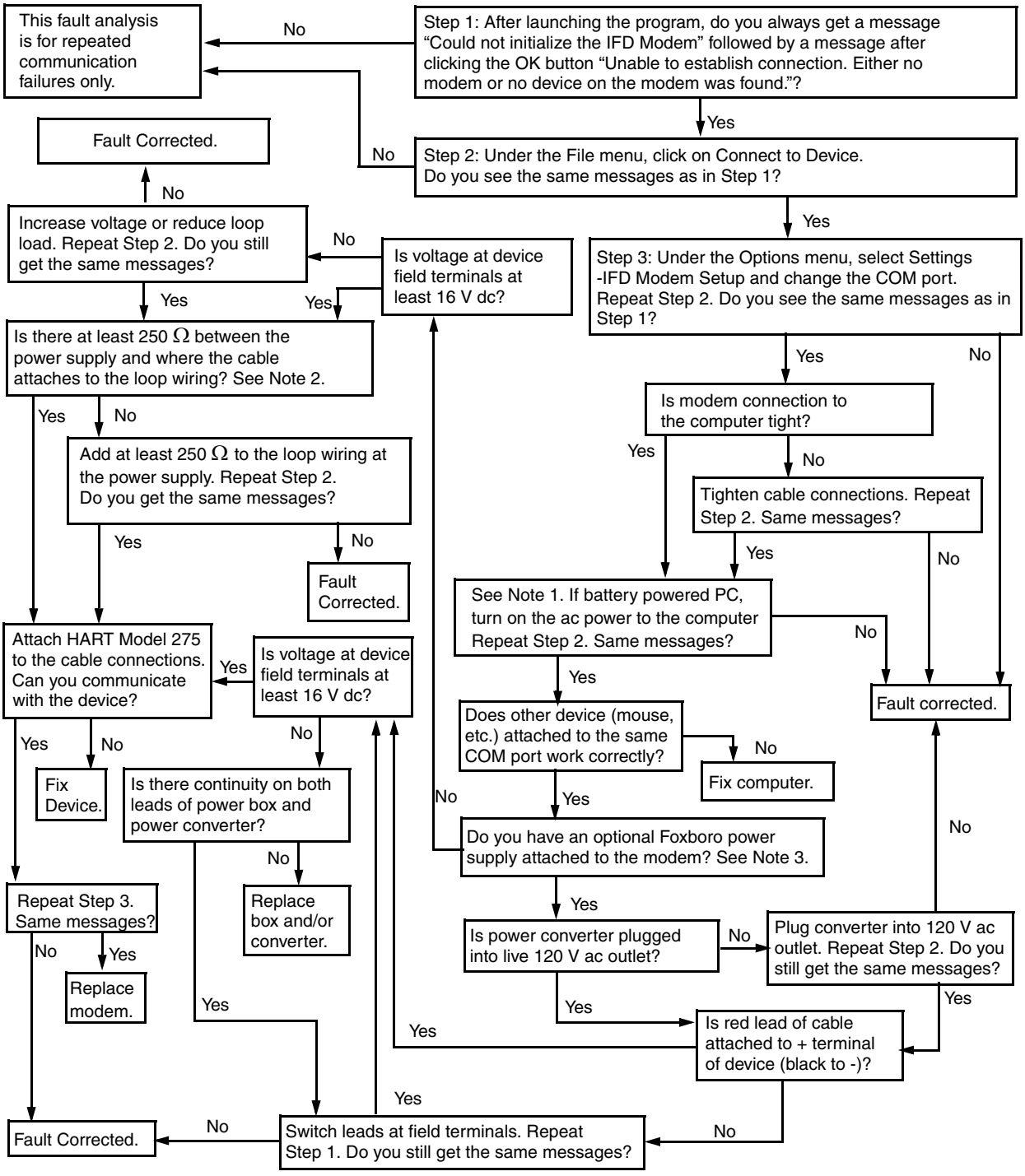
FoxCom Protocol


This fault analysis is for repeated communication failures only.
No
Step 1: After launching the program, do you always get a message "Could not initialize the IFD Modem" followed by a message after clicking the OK button "Unable to establish connection. Either no modem or no device on the modem was found."?
Yes
Fault Corrected.
Step 2: Under the File menu, click on Connect to Device. Do both of the LEDs on the modem (Talk and Listen) light up at various times before you see the messages in Step 1?
No
Increase voltage or reduce loop load. Repeat Step 2. Do you still get the same messages?
No
Yes
Is voltage at device field terminals at least 16 V dc?
Yes
No
Step 3: Under the Options menu, select Settings -IFD Modem Setup and change the COM port. Repeat Step 2. Do both LEDs illuminate?
Yes
Is there at least 200 Ω between the power supply and where the cable attaches to the loop wiring? See Note 2.
Yes
No
No
Replace cable.
Are RS-232 cable connections at modem and computer tight?
Yes
No
Is there more than 350 Ω between the device and where the cable attaches to the loop wiring?
Yes
Add at least 200 Ω to loop wiring at power supply. Repeat Step 2. Do you get the same messages?
No
No
Yes
Is there continuity in the RS-232 cable?
Tighten cable connections. Repeat Step 2. Do both LED's illuminate?
No
Yes
Yes
Yes
No
Yes
Move leads to acceptable position. Repeat Step 2. Do you still get the same messages?
No
Fault Corrected.
If battery powered PC, turn on the ac power to computer. Repeat Step 2. Do both LEDs illuminate?
Yes
See Note 1
Yes
Yes
No
Repeat Step 3. Do both LEDs illuminate?
Yes
Do you still get the same messages shown in Step 1?
Attach Foxboro HHT to the cable connections. Can you communicate with the device?
Yes
Is voltage at device field terminals at least 16 V dc?
No
Yes
No
Yes
No
Does other device (mouse, etc.) attached to the same COM port work correctly?
No
Fix computer.
Fix device
Is there continuity on both leads of power box and power converter?
No
Yes
Yes
No
Do you have an optional Foxboro power supply attached to the modem? See Note 3.
Yes
Plug converter into 120 V ac outlet. Repeat Step 2. Do you still get the same messages?
Is there continuity on both leads of cable and mini-grabbers?
Replace box and/or converter.
Is power converter plugged into live 120 V ac outlet?
No
Yes
Yes
No
Yes
Is red lead of cable attached to + terminal of device (black to -)?
Yes
Replace modem.
Replace cable or minigrabbers.
Yes
Fault Corrected.
No
Switch leads at field terminals. Repeat Step 2. Do you still get the same messages?
No

Note 1. A battery powered PC may not have enough power to the RS-232 COM port to power the modem. Check your PC manual for details regarding power saving adjustments.
Note 2. The 200 ohms are built into FBM18, FBM39, FBM43, FBM44, FBM46, FBM243, FBM246, and PC20 optional power supply.
Note 3. Optional Foxboro power supply cannot be used with Coriolis or Magnetic Flow Transmitters. Also cannot be used with SRD991 Intelligent Valve Positioner when configured for 4 to 20 mA input.

Figure 27. PC20 Fault Analysis - Repeated Communication Failures (FoxCom Protocol)

HART Protocol


Step 1: After launching the program, do you always get a message "Could not initialize the IFD Modem" followed by a message after clicking the OK button "Unable to establish connection. Either no modem or no device on the modem was found."?
No
This fault analysis is for repeated communication failures only.
Yes
Step 2: Under the File menu, click on Connect to Device. Do you see the same messages as in Step 1?
No
Fault Corrected.
Yes
Step 3: Under the Options menu, select Settings -IFD Modem Setup and change the COM port. Repeat Step 2. Do you see the same messages as in Step 1?
Yes
No
Is voltage at device field terminals at least 16 V dc?
No
Yes
Increase voltage or reduce loop load. Repeat Step 2. Do you still get the same messages?
No
Yes
Is there at least 250 Ω between the power supply and where the cable attaches to the loop wiring? See Note 2.
Yes
No
Add at least 250 Ω to the loop wiring at the power supply. Repeat Step 2. Do you get the same messages?
Yes
No
Fault Corrected.
Is modem connection to the computer tight?
Yes
No
Tighten cable connections. Repeat Step 2. Same messages?
Yes
No
See Note 1. If battery powered PC, turn on the ac power to the computer Repeat Step 2. Same messages?
No
Yes
Fault corrected.
Does other device (mouse, etc.) attached to the same COM port work correctly?
No
Fix computer.
Yes
Do you have an optional Foxboro power supply attached to the modem? See Note 3.
No
Yes
Is power converter plugged into live 120 V ac outlet?
No
Plug converter into 120 V ac outlet. Repeat Step 2. Do you still get the same messages?
Yes
Yes
Is red lead of cable attached to + terminal of device (black to -)?
Yes
No
Attach HART Model 275 to the cable connections. Can you communicate with the device?
Yes
No
Is voltage at device field terminals at least 16 V dc?
Yes
No
Fix Device.
Is there continuity on both leads of power box and power converter?
No
Yes
Replace box and/or converter.
Repeat Step 3. Same messages?
No
Yes
Replace modem.
Yes
Fault Corrected.
No
Switch leads at field terminals. Repeat Step 1. Do you still get the same messages?
Yes
No

Note 1. A battery powered PC may not have enough power to the RS-232 COM port to power the modem. Check your PC manual for details regarding power saving adjustments.
Note 2. The 250 ohms are built into the PC20 optional power supply.
Note 3. Optional Foxboro power supply cannot be used with 120 V ac powered Transmitters. Also cannot be used with SRD991 Intelligent Valve Positioner with HART protocol.

Figure 28. PC20 Fault Analysis - Repeated Communication Failures (HART Protocol)

Appendix A. 820, 860, and I/A Series Pressure Transmitters

This appendix provides information that is exclusive to the 820, 860, and I/A Series Intelligent Pressure Transmitters in regards to the Intelligent Field Device Configurator. It contains information on:

- Device Data Screen
- Device Error Messages
- Calibration
- Configuration
- Database Report.

NOTE

This appendix applies to Foxboro I/A Series Pressure Transmitters with both FoxCom and HART protocol. The text applies to both devices unless specifically identified as pertaining to one or the other.

Device Data Screen

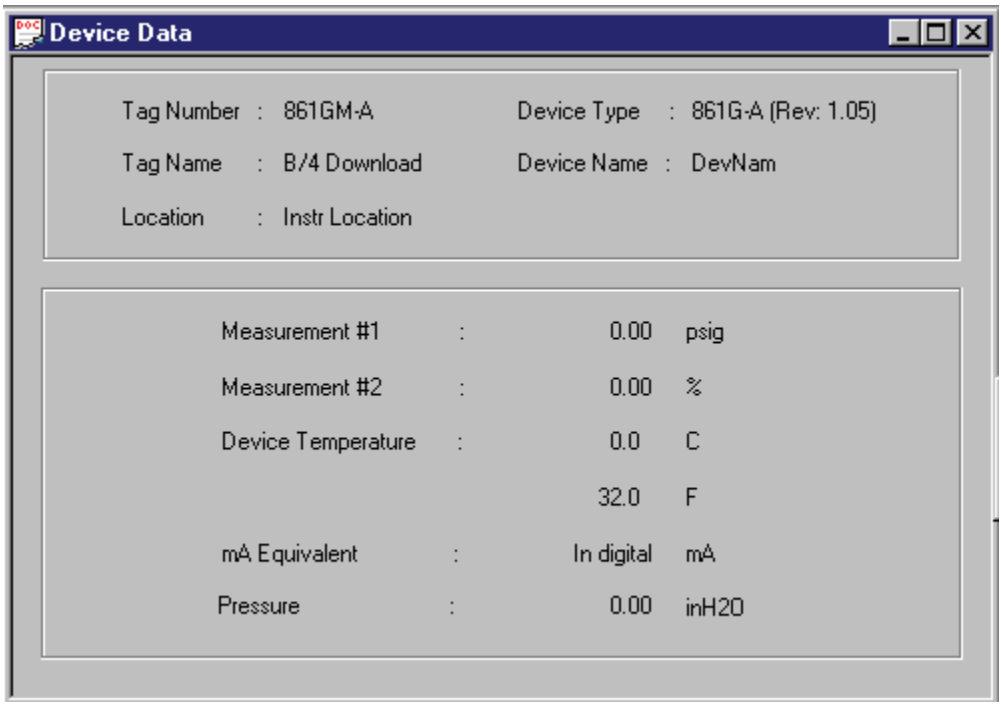

Device Data
Tag Number : 861GM-A
Device Type : 861G-A (Rev: 1.05)
Tag Name : B/4 Download
Device Name : DevNam
Location : Instr Location
Measurement #1 : 0.00 psig
Measurement #2 : 0.00 %
Device Temperature : 0.0 C
32.0 F
mA Equivalent : In digital mA
Pressure : 0.00 inH2O

Figure A-1. Sample Device Data Screen

Error Messages

Status Error Messages

Table 12. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Error Messages to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Electronics Error*	Internal device tests have failed.	Replace electronics.
Sensor1 Out of Rng	Sensor input out of range.	Message disappears when input returns to within acceptable limits.
Temp Sen1 Out of Rng	Transmitter temperature out of range.	Transmitter can be configured to continue operating and use a default temperature for measurement compensation. Message disappears when temperature returns to within acceptable limits.
Temp Sen2 Out of Rng	Transmitter temperature out of range.	Transmitter can be configured to continue operating and use a default temperature for measurement compensation. Message disappears when temperature returns to within acceptable limits.

* 820 and 860 Transmitters only.

Diagnostic Error Messages

NOTE

Before following the recommended actions listed below, try to clear the error message by turning off and reapplying power to the transmitter.

Table 13. Transmitter Diagnostic Error Messages

Code	Error Message	Recommended Action
01	CPU Instruct Error	Replace amplifier.
02	ROM Checksum Error	Replace amplifier.
03	EEPROM Chksum Err	Make a change to the transmitter database and download to the transmitter. If this does not clear the problem, replace amplifier.
04	RAM Error	Replace amplifier.
05	Power Supply Fail	Replace amplifier.
06	Battery Failure	Replace amplifier.
07	Input Range Error	See status to indicate which input is out of range and make necessary correction.
08	Output I/O Error	Replace amplifier.
09	Communication Err	Replace amplifier.
0A	Math Error	Check transmitter database and correct any problems. If problem persists, replace amplifier.
0B	RealTime Clock Err	Replace amplifier.
0C	Input 1 = 0	Sensor input bad; check sensor.
0D	Wrong MCU	Replace amplifier.
0E	Device Failure	Replace amplifier.
20	Input 1 > Up Limit	Sensor input too high, check sensor.[a]
21[b]	Input 2 > Up Limit	Transmitter temperature out of range. Transmitter can be configured to continue operating and use a default temperature for measurement compensation.[a]
22[c]	Input 3 > Up Limit	Transmitter temperature out of range. Transmitter can be configured to continue operating and use a default temperature for measurement compensation.[a]
25[b]	Input 2 < Low Limit	Transmitter temperature out of range. Transmitter can be configured to continue operating and use a default temperature for measurement compensation.[a]
26[d]	Input 3 < Low Limit	Transmitter temperature out of range. Transmitter can be configured to continue operating and use a default temperature for measurement compensation.[a]
29[b]	Input 2 = 0	Transmitter temperature out of range. Transmitter can be configured to continue operating and use a default temperature for measurement compensation.[a]
2F	Offline Cfg w/Err	Replace amplifier.

a. Error message disappears when cause of error returns to within acceptable limits.

b. 860 Transmitter only.

c. 820 Transmitter only.

d. 820 and 860 Transmitters only.

Calibration

You can perform the following calibration procedures on an 820, 860, or I/A Series Pressure Transmitter using the Intelligent Field Device Configurator:

- ReZero Transmitter
- Point Calibration
- ReRange
- mA Calibration
- Restore Default.

The ReZero and Point Calibration procedures adjust the transmitter output. The ReZero procedure zeros the transmitter at the Lower Range Value (LRV). The 1-Point Calibration procedure allows you to establish a calibration point that may or may not be the Lower Range Value (LRV). The 2-Point Calibration procedure allows you to specify lower and upper calibration points that may or may not be the Lower Range (LRV) and Upper Range Values (URV).

Each transmitter is calibrated at the factory to a specified range. If the new range is the same as the factory range, you should perform only a ReZero or a 1-Point Calibration procedure. If the new range changes the span by less than a 2-to-1 ratio, you should perform a ReRange. If you make a large change in range (turndown ratio greater than 2), you may need to perform a 2-Point Calibration to obtain optimum accuracy.

For all calibration procedures, calibration points are read from the transmitter at the start of the procedure. Also note that if the transmitter is configured for a square root output, the IFDC/PC20 places it in linear mode during calibration and resets it to Square Root mode at the end of the procedure.

— NOTE

Transmitters must be calibrated using forward action (increasing input increases output). If your transmitter has reverse output action (increasing input decreases output), calibrate it so that calibrated LRV = desired URV and calibrated URV = desired LRV. Then, after calibration, change the LRV and URV back to the correct values.

On an 820 Series Transmitter, if LRV pressure is negative or if URV = 0, calibrate the transmitter so that LRV = 0 and URV = a positive value equal to the span of the transmitter. After you complete the calibration procedure, reset the LRV and URV to the desired values.

Example: To calibrate for a range of 100 to 0 inches H_2O, first calibrate the LRV to 0 inches H_2O and then calibrate the URV to 100 inches H_2O. Then rerange the LRV to 100 inches H_2O and rerange the URV to 0 inches H_2O.

ReZero

This function enables you to rezero and rerange your device at the Lower Range Value (LRV). The procedure follows:

1. Select **ReZero** from the **Calibration** menu or the ReZero icon from the device toolbar.

2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. If your device is configured for Square Root mode, select **Continue** to change to Linear mode for Calibration. The configuration is automatically placed back in Square Root mode when leaving Calibration. If your device is configured for Linear mode, ignore this step.
4. If your LRV was not zero, you are prompted to change the value if you wish and then **Continue**. If your LRV was zero, ignore this step.
5. When the displayed measurement is stable, select **Continue**. The average of the last five readings is shown. Select **Continue** again to accept this value.
6. Enter the operator's initials and select **Continue**. The current calibration date is automatically displayed. See Figure A-2.
7. Select **ReRange** to change the current range settings or **Continue** to complete the operation.
8. If reranging, enter the new LRV and URV on the ReRange screen and select **Continue**. The ReZero screen reappears. Select **Continue** to complete the operation.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

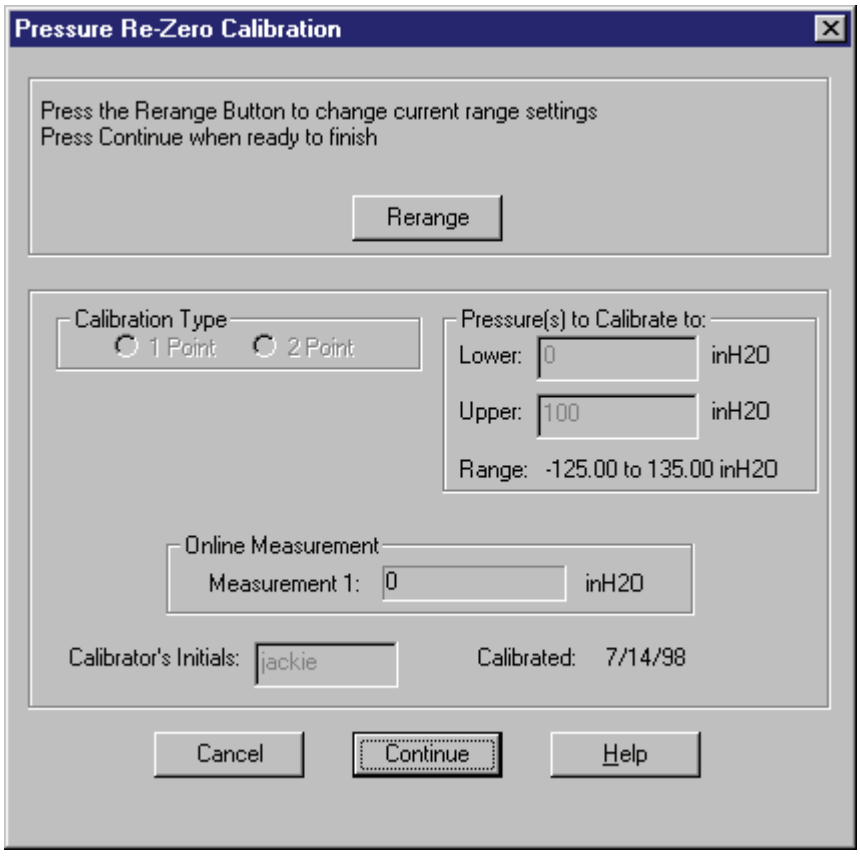


Figure A-2. Sample ReZero Screen

Point Calibration

This function enables you set the Lower Range Value and Upper Range Value and to calibrate the device using points that may or may not be these values. The procedure follows:

1. Select **Point Calibration** from the **Calibration** menu or the Calibration icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. If your device is configured for Square Root mode, select **Continue** to change to Linear mode for Calibration. The configuration is automatically placed back in Square Root mode when leaving Calibration. If your device is configured for Linear mode, ignore this step.
4. Select **1-Point** or **2-Point** Calibration and **Continue**.

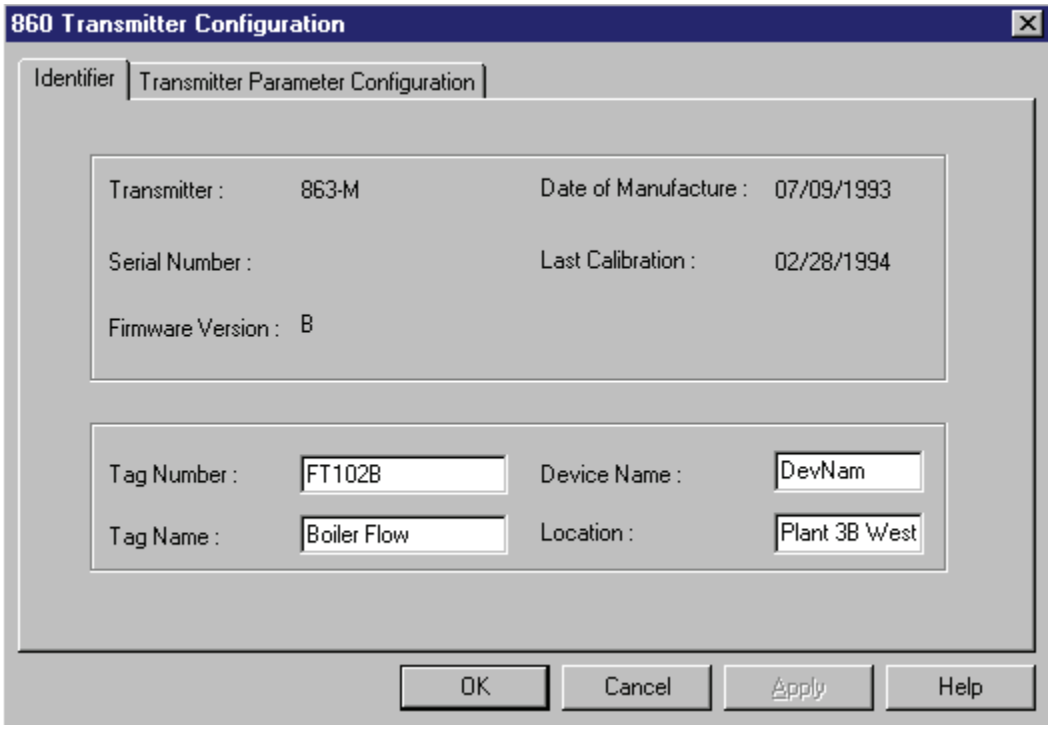


Figure A-3. Sample Point Calibration Screen

5. Enter your desired Lower Calibration Point, apply the lower calibration point pressure to the device, and select **Continue**.
6. When the displayed measurement is stable, select **Continue**. The average of the last five readings is shown. Select **Continue** again to accept this value.
7. If you selected a 2-Point Calibration, enter your desired Upper Calibration Point, apply the upper calibration point pressure to the device, and select **Continue**.
8. When the displayed measurement is stable, select **Continue**. The average of the last five readings is shown. Select **Continue** again to accept this value.

9. Enter the calibrator's initials and select **Continue**. The current calibration date is automatically displayed.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

ReRange

FoxCom Device

This function enables you to rerange your device without applying calibration pressure. The procedure follows:

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter your desired **Lower Range Value** (LRV) and **Upper Range Value** (URV) in either units shown and select **Continue**.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

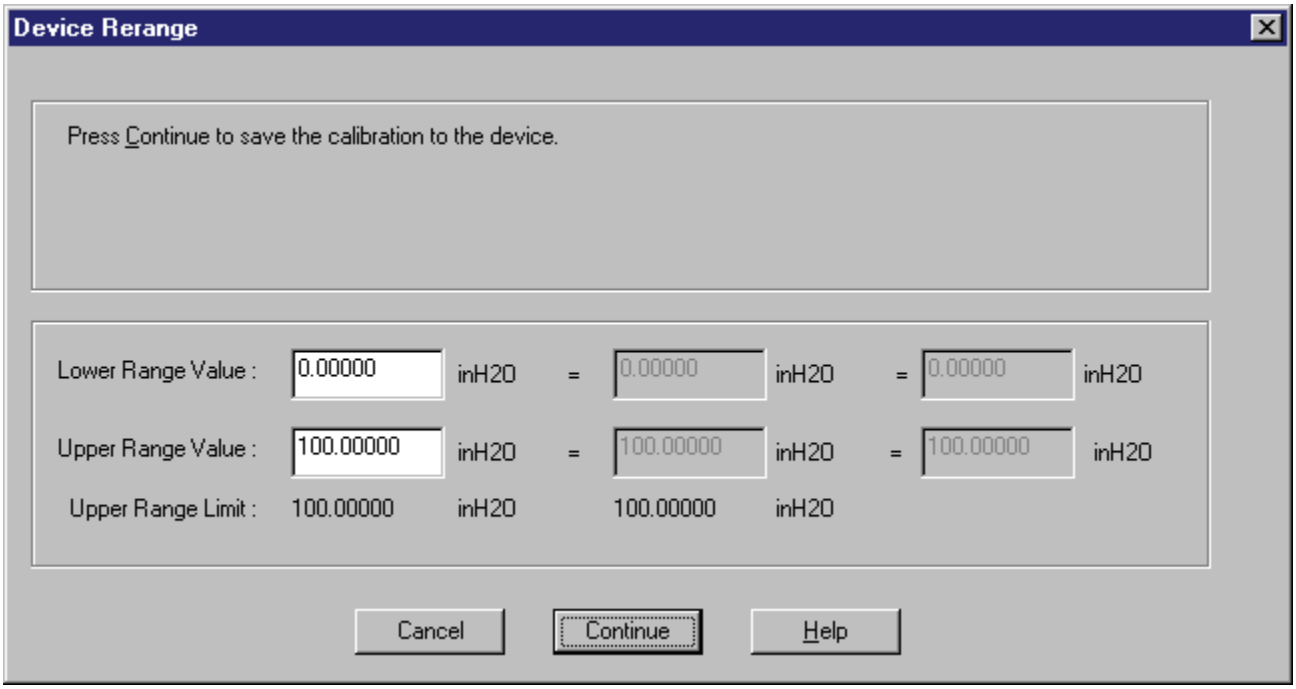


Figure A-4. Sample ReRange Screen (FoxCom Device)

HART Device

This function enables you to rerange your device without applying calibration pressure. The procedure follows:

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter your desired **Lower Range Value** (LRV) and **Upper Range Value** (URV) in units shown. If a measurement is in Square Root mode, enter the **Span** for that measurement. If in Linear mode, enter **Span Offset** for each measurement. Select **Continue**.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

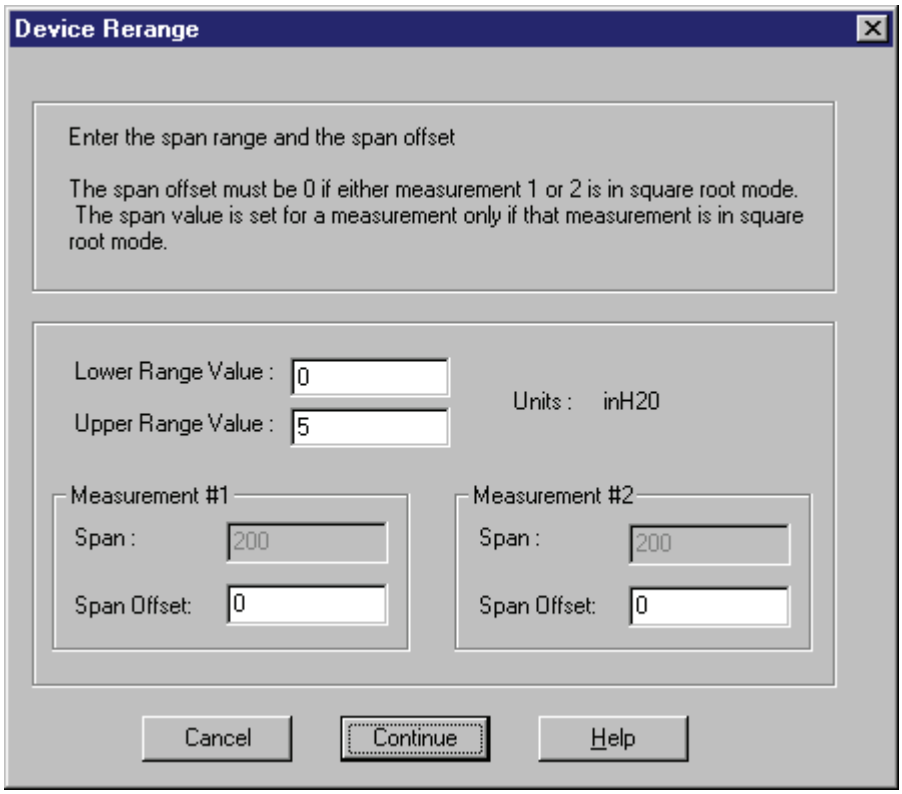


Figure A-5. Sample ReRange Screen (HART Device)

Restore Default

This function enables you to restore all calibration parameters to their factory default settings.

1. Select **Restore Default** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. To reconfirm that you want to restore all calibration parameters to their default settings, select **Continue**.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

— NOTE

Before performing a mA Calibration, perform the Point Calibration procedure described on page 76. A mA calibration may no longer be necessary.

Procedure for a FoxCom Device

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

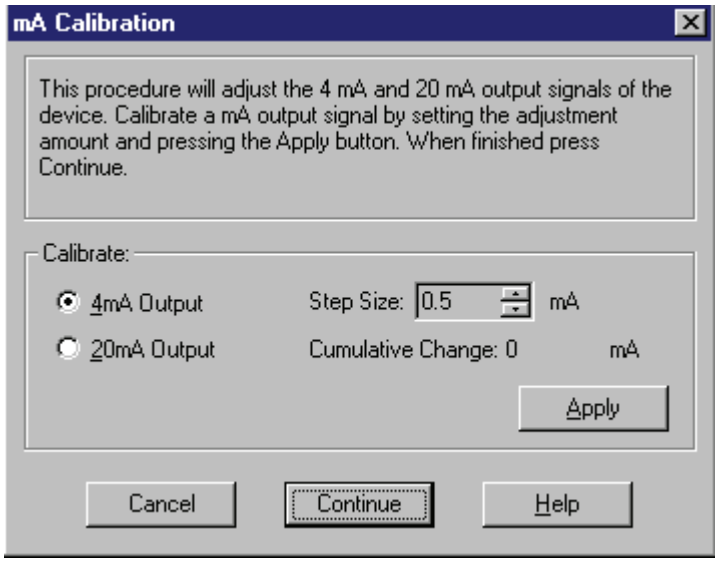

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure A-6. Sample mA Calibration Screen

5. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output on the meter. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.
9. The screen then displays the adjustments. To accept this change and save the calibration to the transmitter, select **Continue**.

10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Procedure for a HART Device

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select the **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

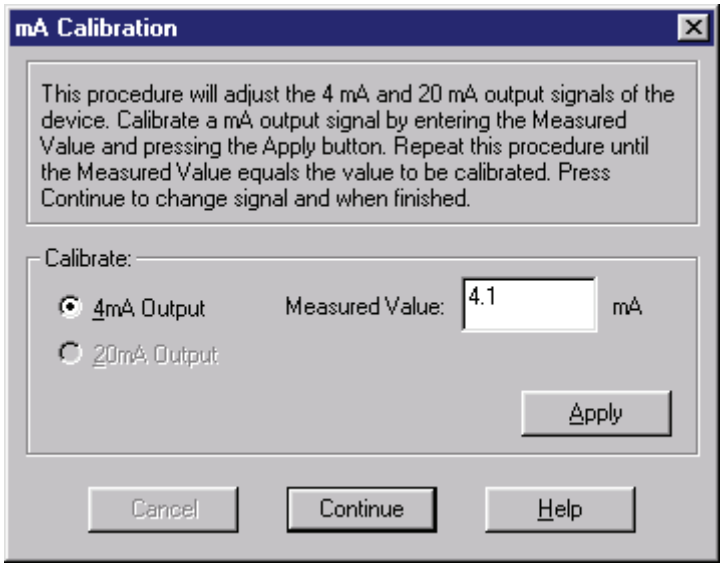

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by entering the Measured Value and pressing the Apply button. Repeat this procedure until the Measured Value equals the value to be calibrated. Press Continue to change signal and when finished.
Calibrate:
4mA Output
Measured Value:
4.1
mA
20mA Output
Apply
Cancel
Continue
Help

Figure A-7. Sample RTT20 mA Calibration Screen (HART Device)

5. Enter the measured value and select **Apply**. Repeat this step until the output matches the measured value.
6. Select **Continue**.
7. Select **20 mA Output**.
8. Enter the measured value and select **Apply**. Repeat this step until the output matches the measured value.
9. Select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

The Identifier screen for a FoxCom device is somewhat different than that for a HART device. A description of each follows:

FoxCom Device

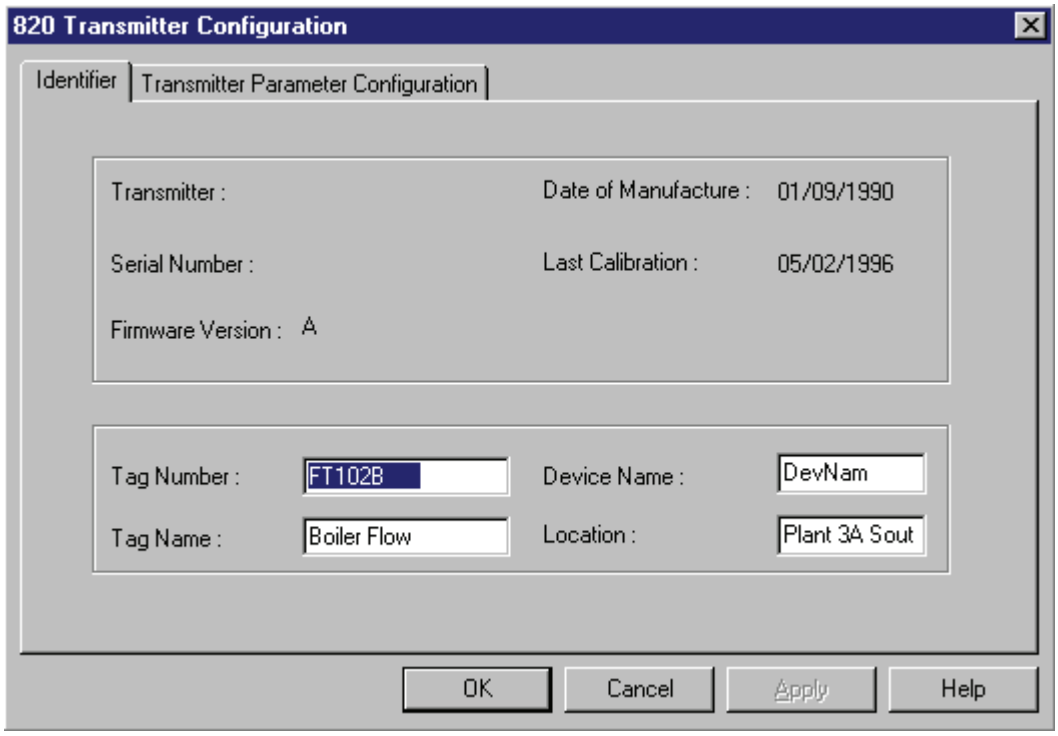


Figure A-8. Sample Identifier Tab Screen (FoxCom Device)

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the database filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Hart Device

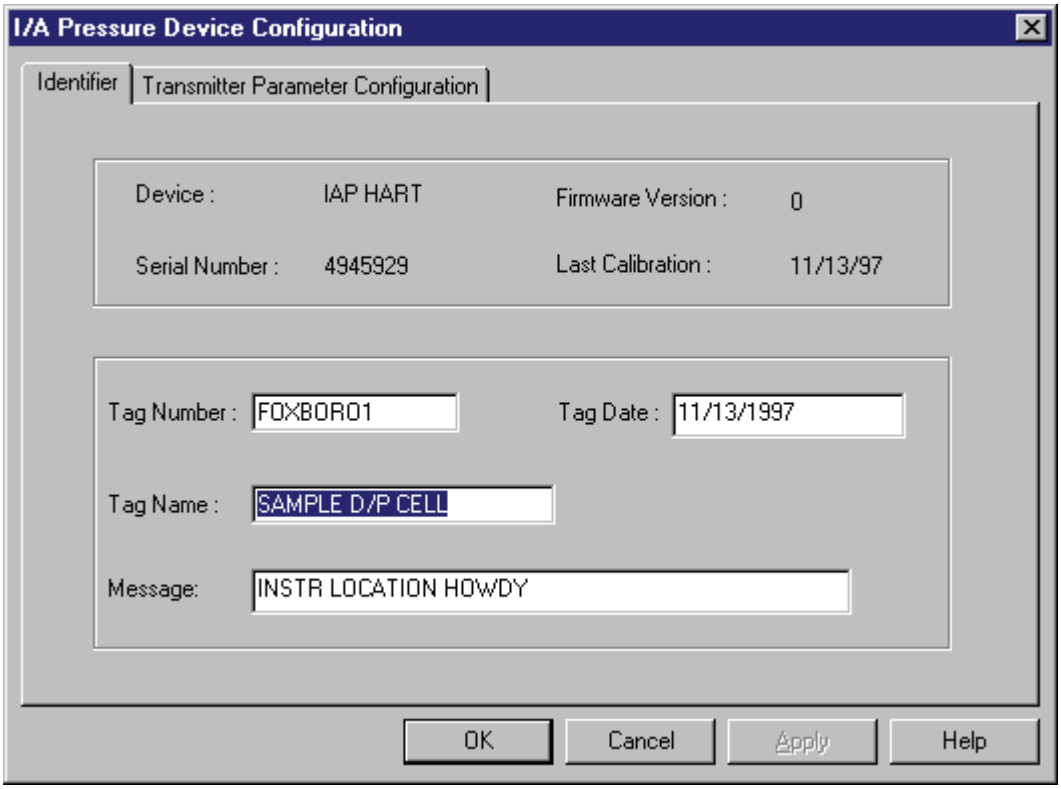


Figure A-9. Sample Identifier Tab Screen (HART Device)

Field	Entry
Tag Number	Enter maximum of 8 characters. The tag number becomes the transmitter filename.
Tag Name	Enter maximum of 16 characters. Optional, used for reference only.
Tag Date	Enter a date. It is possible to enter any valid future or past date. For example, this field may be used for storing the date of the last calibration or a future planned maintenance date.
Message	Enter maximum of 32 characters. This field can be used for company internal designations, device numbers for material industry (business), final alignment of device, startup of device, or other purpose.

Transmitter Parameter Configuration Tab Screen

FoxCom Device

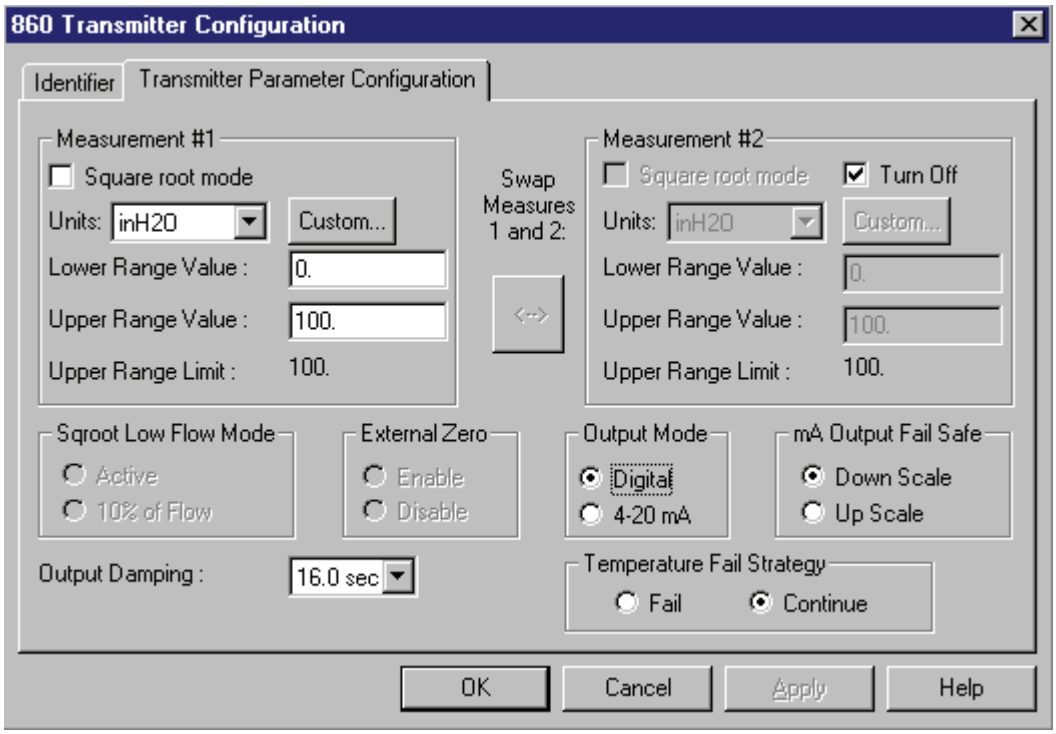


Figure A-10. Sample Transmitter Parameter Configuration Tab Screen (FoxCom Device)

Field	Entry
Measurement #1	
Square Root Mode	√ = Square Root; Blank = Linear.
Units	Select from menu of pressure units or select **Custom** to enter user-configured units.
Lower Range Value	Enter value at which transmitter outputs 4 mA. Must be 0 if M1 or M2 is in Square Root mode.
Upper Range Value	Enter value at which transmitter outputs 20 mA.
Upper Range Limit	Shows value of Upper Range Limit of transmitter.
Measurement #2	Similar to Measurement #1.
Turn off	Enable or Disable Measurement #2.
Sqroot Low Flow Mode	Select **Active** or **10% of Flow.**
External Zero	Not Applicable.
Output Mode	Select **Digital** or **4-20 mA.**
mA Output Fail Safe	Select **Down Scale** or **Up Scale.**
Output Damping	Select one of eight choices from **No Damping** to **16** seconds.

Field	Entry
Temperature Fail Strategy	Select **Fail** or **Continue.**

HART Device

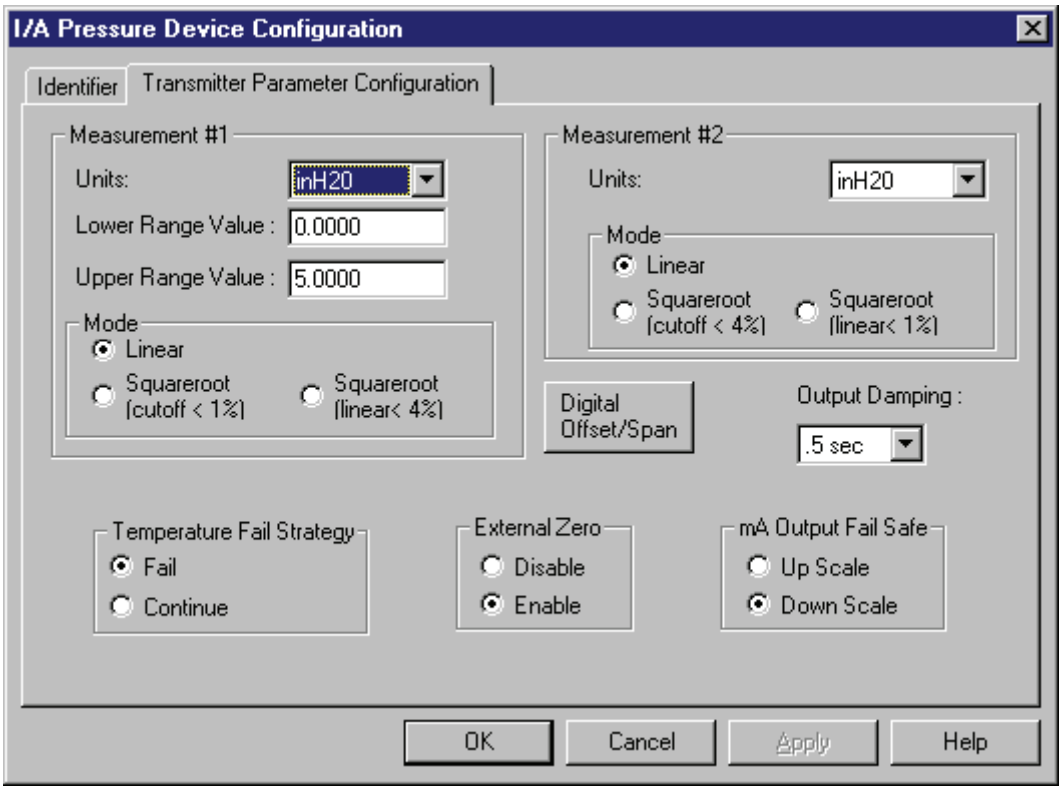


Figure A-11. Sample Transmitter Parameter Configuration Tab Screen (HART Device)

Field	Entry
Measurement #1	
Units	Select from menu of pressure units.
Lower Range Value	Enter value at which transmitter outputs 4 mA. Must be 0 if M1 or M2 is in Square Root mode.
Upper Range Value	Enter value at which transmitter outputs 20 mA.
Mode	Select **Linear**, **Square Root (Cutoff <1%)**, or **Square Root (Linear <4%)**
Measurement #2	
Units	Select from menu of pressure units.
Mode	Select **Linear**, **Square Root (Cutoff <1%)**, or **Square Root (Linear <4%)**
Digital Offset/Span	Enter **Span** or **Offset Span** on screen provided.

Field	Entry
Damping	Select one of eight choices from **No Damping** to **16** seconds.
Temperature Fail Strategy	Select **Fail** or **Continue.**
External Zero	Not Applicable.
mA Output Fail Safe	Select **Down Scale** or **Up Scale.**

Database Report

Table 14. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	2d	Formula Set 1	03 03 13 01 0b 80 03 70 0c 7c 02 02
Tag Number	PC10_20_STD2	Formula Set 2	0b 00 03 68 0c 74 02 01 05 39 03 34
Tag Name	UNIT 08 #2	Formula Set 3	0c 01 03 30 0c 02 02 03 05 2d 03 28
Device Name	DevNam	Formula Set 4	0c 01 03 24 0c 01 03 20 03 03 0c 02
Geo Location	TEST LAB #2	Formula Set 5	02 03 05 1d 03 18 0c 01 03 14 0c 01
Meas #1 Units	inH2O	Formula Set 6	03 10 03 03 0c 02 02 03 05 0d 03 08
Meas #1 Units	inH2O	Formula Set 7	0c 01 03 04 0c 01 03 00 03 03 13 00
#1 Upper Range Value	100	Formula Set 8	02 03 14 01 02 01 04 01 03 01 03 03
#1 Lower Range Value	0	Formula Set 9	00 61 0c 01 02 01 14 01 03 01 02 03
Meas #1 Span	100	Formula Set 10	05 5e 03 58 0c 02 02 02 05 55 03 02
Meas #1 Offset	0	Formula Set 11	03 50 13 01 02 02 03 03 ff
Meas #2 Span	100	Formula Set 12	ff ff ff ff ff ff ff ff ff
Meas #2 Offset	0	Formula Set 13	ff ff ff ff ff ff ff ff ff
Serial Number	Neponset#	Formula Set 14	ff ff ff ff ff ff ff ff ff
Calib Initials	jackie	Formula Set 15	02 00 03 01 23 00 43 01 63
Last Calib Date	7/14/98	Formula Set 16	ff ff ff ff ff ff ff ff ff
Sensor Mfg Date	9/30/93	Coef #01	0
Calibration Slope	1	Coef #02	0
Calibration Offset	0	Coef #03	0
Personality Word	0	Coef #04	0
Sensor Id Number	0c 01	Coef #05	0
Sensor MS Code	01	Coef #06	0
Device Type	00	Coef #07	0
Manufacture Date	12/21/93	Coef #08	0
Minor Revision Code	05	Coef #09	0
Major Revision Code	01	Coef #10	0
Max Request Length	6656	Coef #11	0
Max Reply Length	5376	Coef #12	0
Max Param Number	69	Coef #13	0
TON Count (4 mA)	600	Coef #14	0
TON Count (20 mA)	3200	Coef #15	0
Misc. Flags	01	Coef #16	0
Freq Strategy Flg	01	Coef #17	0
Database Chng Cntr	cb	Coef #18	0
n/a	00	Coef #19	0
Scan Rate (Freq 1)	00	Coef #20	0
Scan Rate (Freq 2)	1f	Coef #21 Temp C1	-28.7518
Scan Rate (Freq 3)	00	Coef #22C2	-1.946529
Scan Rate (Freq 4)	00	Coef #23C3	115.1565
Clk Div Factor 1	00	Coef #24	1.507587
Clk Div Factor 2	00	Damping	1
Clk Div Factor 3	00	Sqroot Turndown	1
Clk Div Factor 4	00	Coef #27 -F1LRV	3.155942

Table 14. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Freq 1 Upper Rnge	32	Coef #28	0
Freq 2 Upper Rnge	241	Coef #29 -F3LRV	-0.6692498
Freq 3 Upper Rnge	22	Coef #30 1/F1Span	0.1595369
Freq 4 Upper Rnge	0	Coef #31	0
Freq 1 Lower Rnge	-8	Coef #03	8.620579
Freq 2 Lower Rnge	96	n/a	00
Freq 3 Lower Rnge	-8	Comm Turnaround	01
Freq 4 Lower Rnge	0	Diag Error Code	00 00
Test S/R Address	ff ff	Clock Cor. IT1	0
Default Freq 2	134	Clock Cor. IT2	0
Default Freq 3	1	Reserved	00 00 00 00 00 00 00 00 00
Default Freq 4	1	EEPROM Checksum	0

Appendix B. RTT10 Temperature Transmitters

This appendix provides information that is exclusive to the RTT10 Temperature Transmitters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Device Error Messages
- Calibration
- Configuration
- Database Report.

Device Data Screen

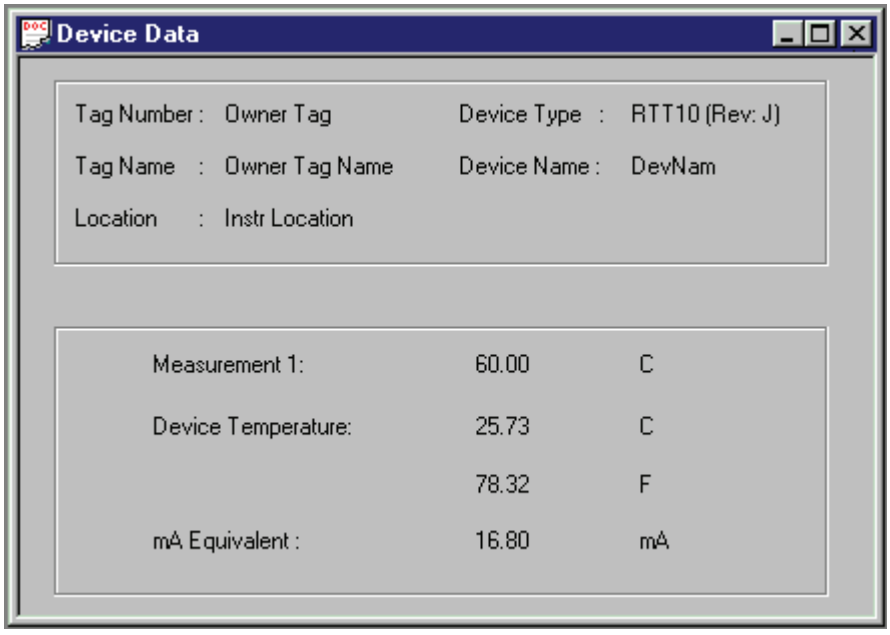

Device Data
Tag Number : Owner Tag
Device Type : RTT10 (Rev: J)
Tag Name : Owner Tag Name
Device Name : DevNam
Location : Instr Location
Measurement 1: 60.00 C
Device Temperature: 25.73 C
78.32 F
mA Equivalent : 16.80 mA

Figure B-1. Sample RTT10 Device Data Screen

Error Messages

Table 15. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Sent	Transmitter sent a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Sensor #1 Failed	Sensor #1 malfunction.	Check and/or replace Sensor #1 and associated sensor wiring.
Sensor #2 Failed	Sensor #2 malfunction.	Check and/or replace Sensor #2 and associated sensor wiring.
Electronics Failed	Internal RTT10 tests have failed.	Replace electronics.

Calibration

You can perform the following calibration procedures on an RTT10 transmitter using the Intelligent Field Device Configurators:

- ReZero Transmitter
- N-Point Calibration
- Custom Input Curve
- ReRange
- mA Calibration
- Restore Factory Calibration
- Restore Factory mA
- Enable Custom Curve.

RTT10 calibration allows you to correct the transmitter output for differences between the input sensor and the standard curve for sensors of that type. The ReZero and N-Point Calibrations

automatically calculate the temperature points and offset values. The custom curve function allows you to enter up to ten sets of points, but you must determine the offset values.

ReZero

This function enables you to set your transmitter input to zero. The procedure to do this is as follows:

1. Select **ReZero** from the **Calibration** menu or the ReZero icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. At the prompt, select **Continue** again.
4. Select **Continue** when ready to set input to 0.00 equivalent.
5. When the displayed measurement is stable, select **Continue**.
6. The final ReZero value is shown. Select **Continue** again to accept this value and save the calibration to the transmitter.
7. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

N-Point Calibration

This function enables you to perform a 1- or 2-Point Calibration.

For a 1-Point Calibration, a constant offset is computed and utilized over the entire sensor curve and for a 2-Point Calibration, the resulting offsets are straightline calculated to the LRV and URV.

The procedure to do an N-Point Calibration is as follows:

1. Select **N-Point Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **1-** or **2-Point** calibration. Enter the Lower and Upper Range Values and the desired reading you want to see reported for each calibration point. Select **Continue**.

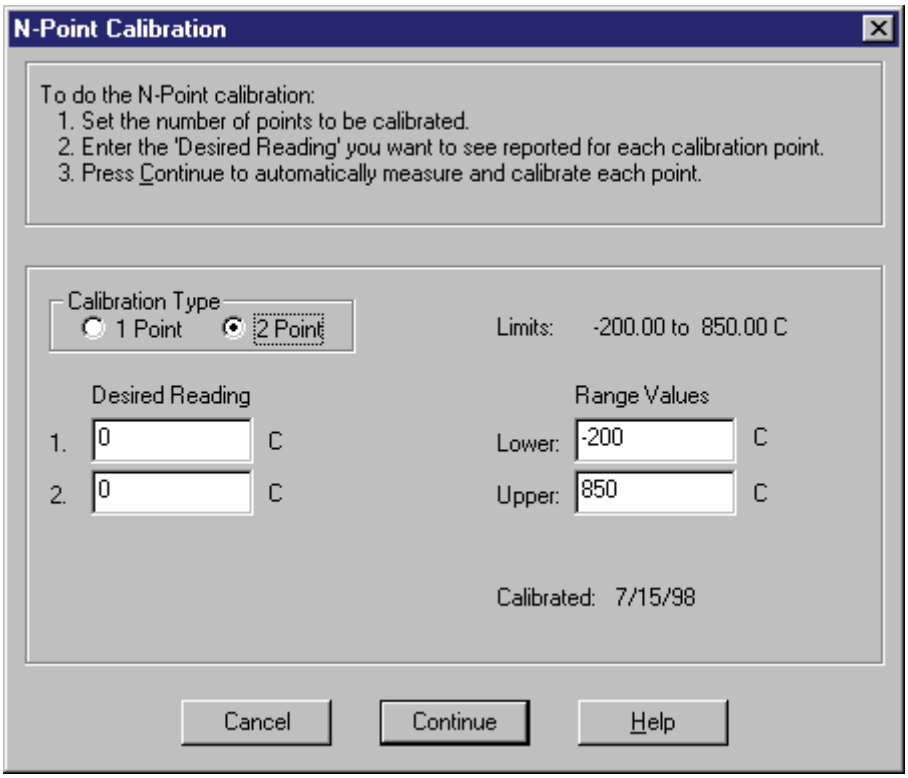


Figure B-2. Sample RTT10 N-Point Calibration Screen

4. Select **Continue** again when you are ready to set the input for Calibration Point 1.
5. When the displayed measurement is stable for Calibration Point 1, select **Continue**.
6. At the prompt, select **Continue** again to accept this value and save it to the transmitter.
7. Repeat Steps 4 through 6 for Calibration Point 2.
8. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

ReRange

This function enables you to rerange your device without applying inputs representing temperatures. The procedure to do this is as follows:

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter your desired Lower Range Value (LRV) and Upper Range Value (URV) and select **Continue**.

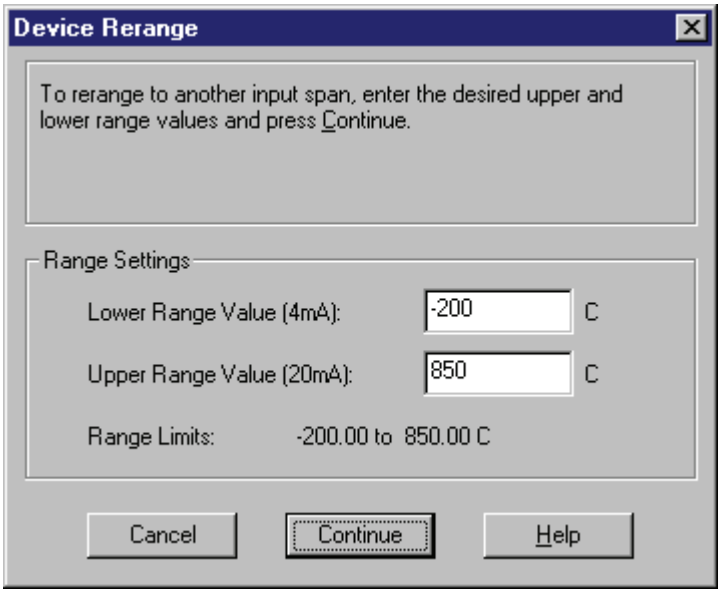


Figure B-3. Sample RTT10 ReRange Screen

4. At the prompt, select **Continue** to save the new range to the transmitter.
5. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

Custom Input Curve

This function permits you to correct for inaccuracies in the input sensor by entering measurement and offset values for 12 points on the curve. The system then calculates a smooth input curve that follows these 12 data points.

NOTE

After performing the Custom Input Curve procedure, the custom curve must be enabled before it takes effect. See "Enable Custom Curve" on page 94.

The procedure to input a custom curve follows:

1. Select **Custom Input Curve** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select the number of points you want in your custom curve (1-12). The remaining points are set to an overrange value (for example, 10000).

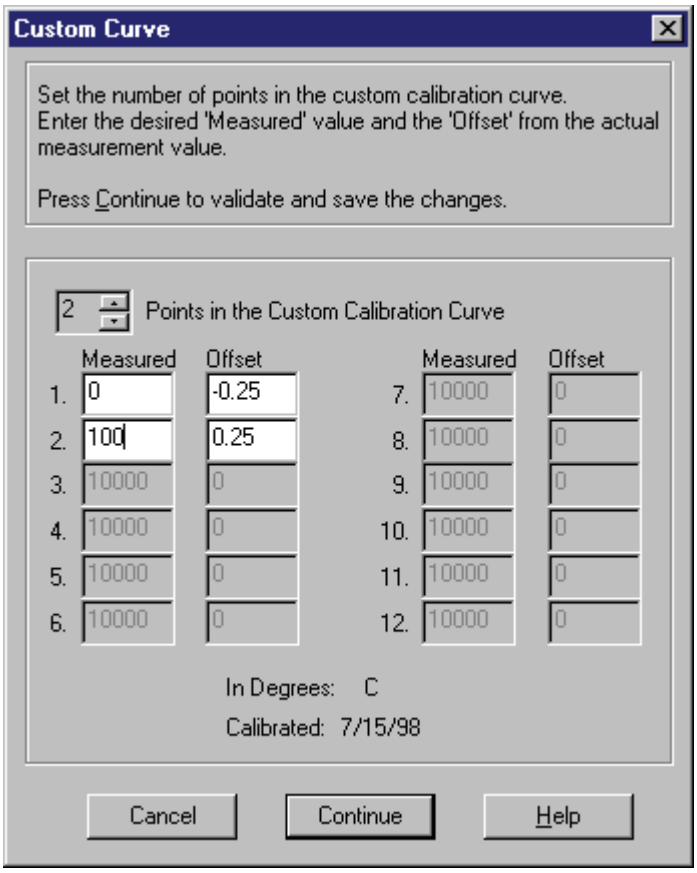


Figure B-4. Sample RTT10 Custom Input Curve Screen

4. In the **Measured** column, enter the values the RTT10 now displays; in the **Offset** column, enter the offset you want. For example, if a **Measured** value was 100.00 but you wanted 100.25, enter 100.00 as the **Measured** number and 0.25 as the **Offset** number. Select **Continue**.
5. At the prompt, select **Continue** to save the custom curve to the transmitter.
6. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

Enable Custom Curve

This function enables a custom input curve that you previously entered. The procedure follows:

1. Select **Enable Custom** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. To reconfirm that you want to enable the Custom Curve, select **Continue**. The Custom Curve is enabled.

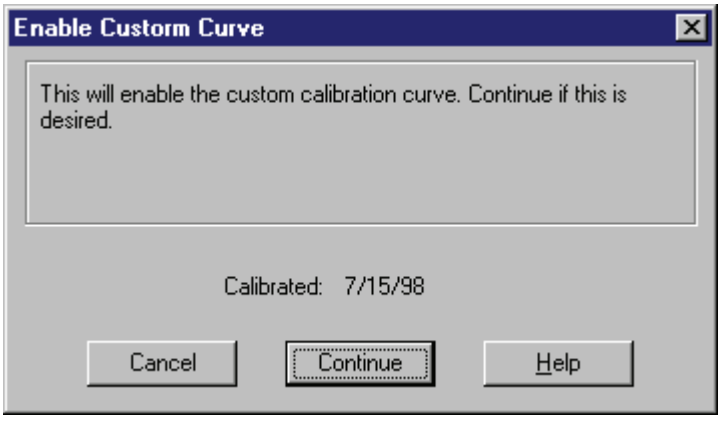


Figure B-5. RTT10 Enable Custom Curve Screen

4. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory Calibration

This function overwrites any existing 1-Point, 2-Point, or Custom Curve calibration and restores the Factory Calibration curve to the transmitter. The procedure follows:

1. Select **Restore Factory Cal** from the Calibration menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. To reconfirm that you want to overwrite your present N-Point or Custom Calibration and restore the Factory Calibration, select **Continue**.
4. The factory calibration is restored.
5. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory mA

This function restores the mA calibration factory settings. The procedure to do this is as follows:

1. Select **Restore Factory mA** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. To reconfirm that you want to restore the mA calibration factory settings, select **Continue**. The factory calibration is restored and calibration date automatically changes.
4. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does

not agree with the value measured by an accurate mA meter installed in the loop wiring.

— NOTE

Before performing a mA Calibration, perform the N-Point Calibration procedure described on page 91. A mA calibration may no longer be necessary.

The procedure to perform a mA Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

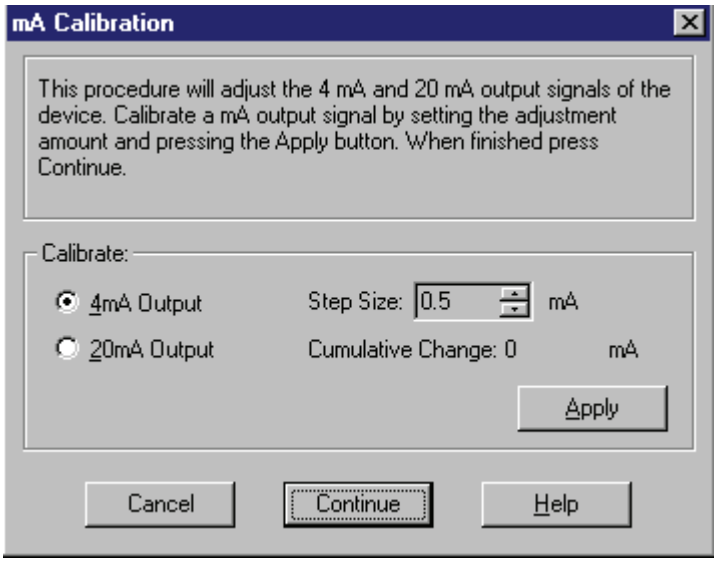

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure B-6. Sample RTT10 mA Calibration Screen

5. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown in the screen.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

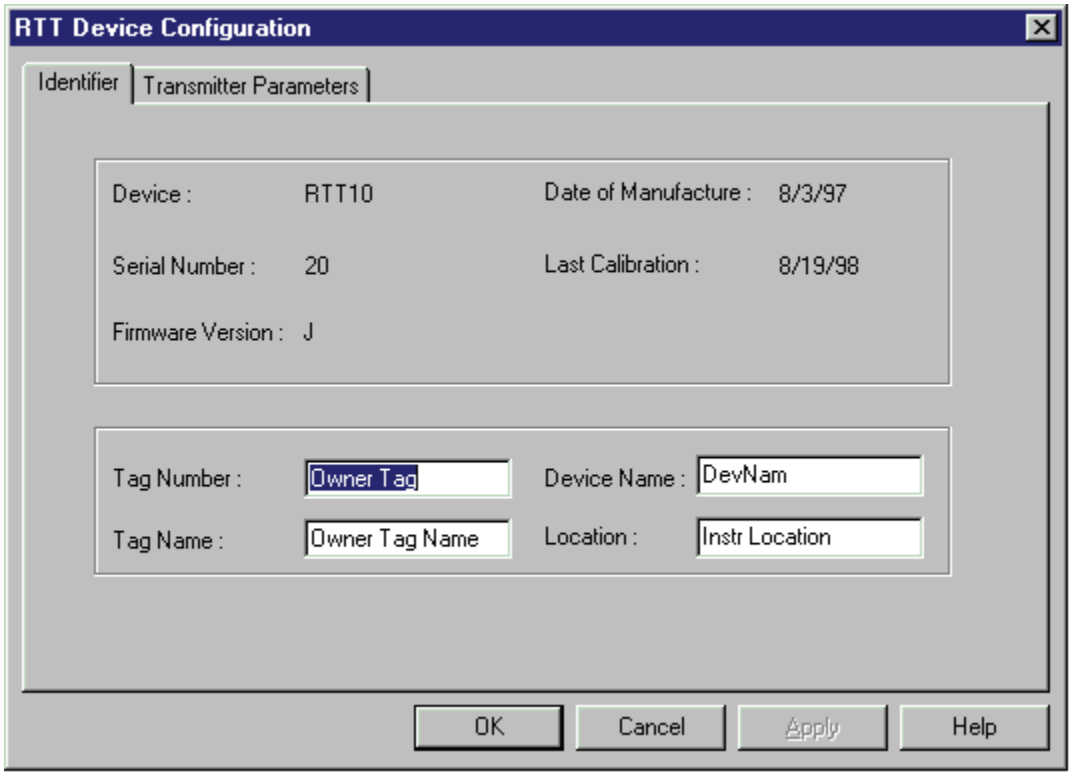


Figure B-7. Sample RTT10 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam.**
Location	Enter maximum of 14 characters. Optional, used for reference only.

Transmitter Parameters Tab Screen

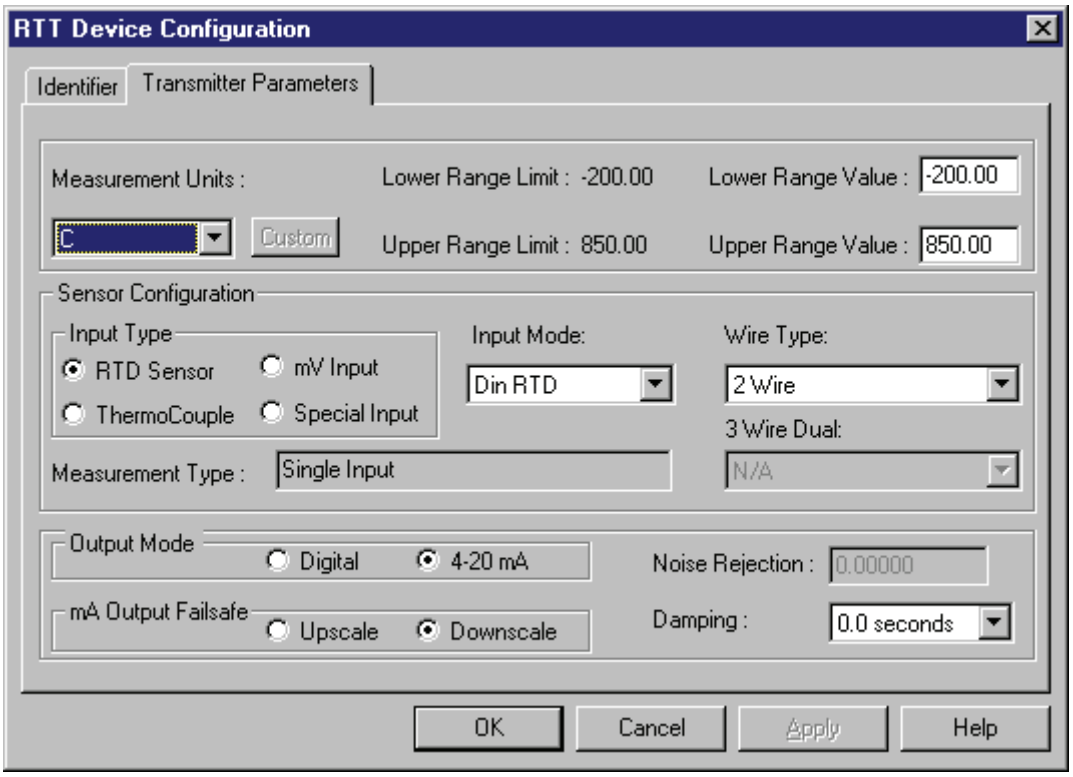


Figure B-8. Sample RTT10 Transmitter Parameters Tab Screen

Field	Entry
Measurement Units	Select from menu of units.
Lower Range Limit	Shows value of the Lower Range Limit of transmitter.
Upper Range Limit	Shows value of the Upper Range Limit of transmitter.
Lower Range Value	Enter the value at which transmitter outputs 4 mA.
Upper Range Value	Enter the value at which transmitter outputs 20 mA.
Input Type	Select **RTD Sensor**, **ThermoCouple**, **mV Input**, or **Special Input**.
Input Mode	Select from menu of inputs.
Wire Type	For RTD, select **2-Wire**, **Single/3-Wire**, **Dual/3-Wire**, or **4-Wire**.
Measurement Type	Shows **Dual** for Dual/3Wire; **Single Input** for all other wire types.
3-Wire Dual	For Dual/3-Wire RTD, select **Average**, **Redundant**, or **Difference**.
Output Mode	Select **Digital** or **4-20 mA**.
mA Output Failsafe	Select **Upscale** or **Downscale**. Configures output to go upscale or downscale if a transmitter failure occurs.
Noise Rejection	Enter filter value in seconds during which noise in the transmitter output signal is rejected. A low value decreases filtering action; a high value increases it.

Field	Entry
Damping	Select one of nine choices from **No Damping** to **32** seconds.

Database Report

— NOTE

If a parameter in the report is "UNUSED," the corresponding value shown has no meaning for that device.

Table 16. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	31	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Tag Number	PC10_20_STD2	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Tag Name	TEST STD #2	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Device Name	DevNam	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Geo Location	TEST LAB #2	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Meas #1 Units	C	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Meas #2 Units	mV	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Upper Range Value	850	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Lower Range Value	-200	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Upper Range Limit	850	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Lower Range Limit	-200	UNUSED	00 00 00 00 00 00 00 00 00
Noise Rejection	0	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED	6.894108e-041	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED		UNUSED	00 00 00 00 00 00 00 00 00
UNUSED		UNUSED	00 00 00 00 00 00 00 00 00
Last Calib Date	7/16/98	UNUSED	00 00 00 00 00 00 00 00 00
Sensor Mfg Date	1/15/90	Cal Point 1	0
UNUSED	0	Cal Offset 1	0.25
UNUSED	1.101654e-033	Cal Point 2	10000
UNUSED	0	Cal Offset 2	0
Sensor Id Number	05 00	Cal Point 3	10000
Input Type	21	Cal Offset 3	0
Device Type	00	Cal Point 4	10000
Manufacture Date	12/30/35	Cal Offset 4	0
Minor Revision Code	00	Cal Point 5	10000
Major Revision Code	01	Cal Offset 5	0
Max Request Length	18	Cal Point 6	10000
Max Reply Length	18	Cal Offset 6	0
Max Param Number	00	Cal Point 7	10000
4 mA Cal Offset	3000	Cal Offset 7	0
20 mA Cal Offset	3000	Cal Point 8	10000
Misc. Flags	81	Cal Offset 8	0
Freq Strategy Flg	00	Cal Point 9	10000
Database Chng Cntr	cd	Cal Offset 9	0

Table 16. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
UNUSED	61	Cal Point 10	10000
UNUSED	b3	Cal Offset 10	0
UNUSED	00	Cal Point 11	10000
UNUSED	01	Cal Offset 11	0
UNUSED	b8	Cal Point 12	10000
UNUSED	0b	Cal Offset 12	0
UNUSED	b8	Damping	0
UNUSED	0b	4 mA TON Count	403.378
UNUSED	c1	20 mA TON Count	8017.203
UNUSED	5.238894e-041	UNUSED	5.918636e-039
UNUSED	0	UNUSED	-1.654361e-023
UNUSED	0	UNUSED	1.762151e-038
UNUSED	0	UNUSED	0
UNUSED	0	UNUSED	5.920878e-039
UNUSED	0	UNUSED	00
UNUSED	0	Comm Turnaround	00
UNUSED	0	Diag Error Code	00 00
UNUSED	00 00	UNUSED	5.852216e-039
UNUSED	0	UNUSED	-6.462349e-027
UNUSED	0	N_A	84 2e 41 00 00 00 00 00 00
UNUSED	0	EEPROM Checksum	0

Appendix C. RTT20/TI20 Temperature Transmitters

This appendix provides information that is exclusive to the RTT20 and TI20 Temperature transmitters in regards to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Status Error Messages
- Calibration
- Configuration
- Database Report.

NOTE

1. This appendix applies to RTT20 transmitters with both FoxCom and HART protocols. The text applies to both devices unless specifically identified as pertaining to one or the other.
2. The RTT20 and the TI20 transmitters are identical with respect to the FoxCom protocol. All other references to RTT20 also apply to the TI20 transmitter.

Device Data Screen

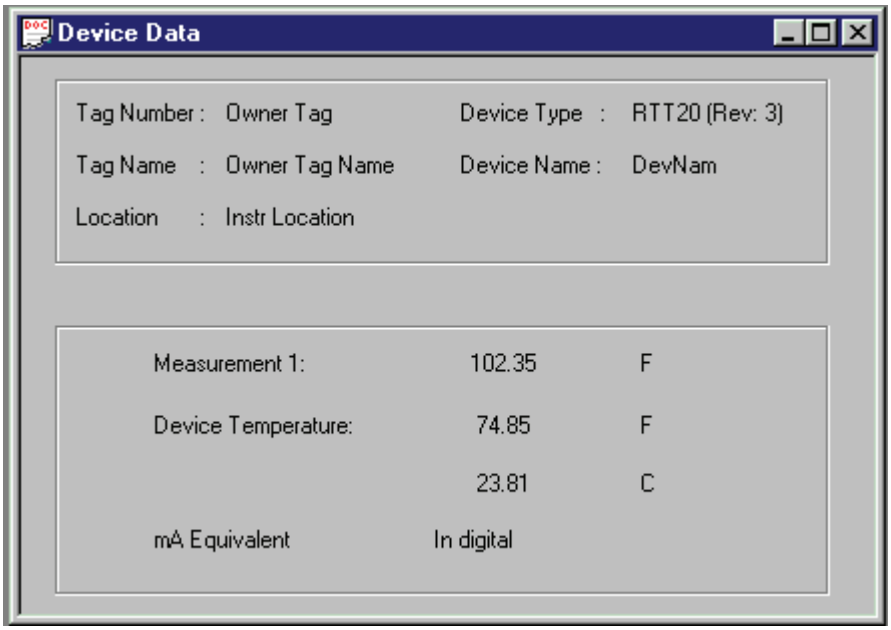

Device Data
Tag Number : Owner Tag
Device Type : RTT20 (Rev: 3)
Tag Name : Owner Tag Name
Device Name : DevNam
Location : Instr Location
Measurement 1: 102.35 F
Device Temperature: 74.85 F
23.81 C
mA Equivalent In digital

Figure C-1. Sample RTT20 Device Data Screen

— NOTE

The Device Data screen for the HART transmitter does not have the Device Name and Location parameters.

Error Messages

Table 17. Transmitter Status Error Messages for a FoxCom Transmitter

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Sent	Transmitter sent a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Sensor #1 Failed	Sensor #1 malfunction.	Check and/or replace Sensor #1 and associated sensor wiring.
Sensor #2 Failed	Sensor #2 malfunction.	Check and/or replace Sensor #2 and associated sensor wiring.
Electronics Fail	Internal RTT20 tests have failed.	Replace electronics.

Table 18. Transmitter Status Error Messages for a HART Transmitter

Message	Explanation	Recommended Action
HART Status		
Device Busy	Transmitter is busy.	Try the command again later.
Device Malfunction	Severe problem.	Check the other status bits.
Configuration Changed	The configuration of the transmitter has been changed.	This flag can be reset with the menu item **Reset Changed Flag**.
Cold Start	Device rebooted.	Check power supply.

Table 18. Transmitter Status Error Messages for a HART Transmitter (Continued)

Message	Explanation	Recommended Action
Output Current Fixed	The output current is fixed. The reason might be that it is in the fail-safe state.	The **Device Specific Transmitter Status** may show the reason for the fail-safe state.
Analog Output Saturated	Analog Output out of 4 to 20 mA range.	PV exceeds the configured range. Check range limits.
Variable (not Primary) out of Limits	Electronic or sensor temperature out of limits.	Check **Device Specific Transmitter Status** for more information.
Primary Variable out of Limits	Sensor signal out of limits.	Check **Device Specific Transmitter Status** and applied process value.
Device Specific Transmitter Status		
Configured Measuring Range Invalid	The measuring range exceeds the upper and/or lower range limits.	Check range.
Device Temperature outside -40/85 C	The device temperature was outside the range of -40°C and +85°C.	Check device or the temperature of the environment.
Sensor Open or Short	The resistance of the sensor is greater (or less) than the expected resistance.	Check sensor. Refer to the Functional Test in MI EMT 0111 A.
PV out of Sensor Limit or Bad	PV was not between +/-110% of nominal range.	Check measurement input.
PROM Checksum Error	The PROM may be damaged.	Replace transmitter.
EPROM Failed	The EEPROM may be damaged.	Replace transmitter.
Redundant Sensor Failed	Sensor 1 failed.	Check sensor.
Transmitter Failed	Electronics may be damaged.	Replace the basic transmitter.

Calibration

You can perform the following calibration procedures on an RTT20 transmitter using the Intelligent Field Device Configurators:

- N-Point Calibration
- Custom Input Curve
- ReRange
- mA Calibration
- Restore Factory mA
- ReZero Transmitter (for HART device with RTD sensor only).

N-Point Calibration

This function enables you to perform a 1-, 2-, 3-, or 5-Point Calibration. The differences are explained below.

1-Point Calibration

The RTT20 permits you to select any temperature within the configured range that is of particular interest to you. You are not required to use the LRV as the calibration point. The net effect is that a constant offset is utilized over the entire sensor curve. To view or change the value entered, see the note in "Custom Input Curve" on page 105.

2-Point Calibration

The RTT20 permits you to select any two temperatures in the region of interest within the configured range of the transmitter. You are not required to use the LRV and URV as the calibration points. The temperatures must be increasing in value. The resulting offsets are then straightline calculated to the LRV and URV. Picture an offset line defining the correction to the standard, starting from the LRV, passing through the two calibration points, and continuing to the URV. To view or change any value entered, see the note in Custom Input Curve section on page 105.

3- and 5- Point Calibration

The RTT20 permits you to select any three (or five) temperatures in the region of interest within the configured range of the transmitter. The temperature must be increasing in value. The resulting offsets are then straightline calculated to the LRV and URV. Picture an offset line defining the correction to the standard, starting from the LRV, passing through the three (or five) calibration points, and continuing to the URV. To view or change any values entered, see note in "Custom Input Curve" on page 105.

N-Point Calibration Procedure

1. Select **N-Point Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **1-**, **2-**, **3-**, or **5-Point Calibration**. Enter the desired reading you want to see reported for each calibration point, enter the calibrator's initials, and select **Continue**.

— NOTE

On 3-point and 5-point calibrations, the end points are fixed. Therefore, you only need to enter the mid point values.

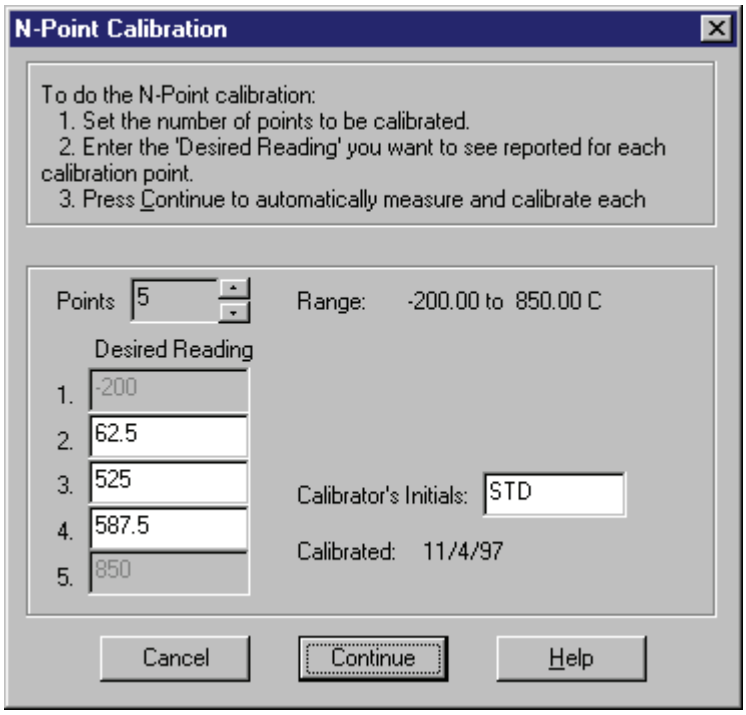


Figure C-2. Sample RTT20 N-Point Calibration Screen

4. Select **Continue** when you are ready to set input for Calibration Point 1.
5. Select **Continue** again when ready to set input to desired reading.
6. When the displayed measurement is stable for Calibration Point 1, select **Continue** again.
7. Repeat Steps 4 through 6 for each point.
8. Select **Continue** to save the calibration to the transmitter. The current calibration date is automatically displayed.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Custom Input Curve

The Custom Input Curve screen functions a little differently. If the **Points** field is 0, then the transmitter is using the factory installed calibration. If the number of points is 2 to 22, the transmitter uses the calibration data entered into the custom curve table.

— NOTE

Since it is not possible to leave the input calibration values in memory when performing a Custom Input Curve calibration, it is **strongly recommended** that the transmitter database be stored to a file prior to making drastic changes in the calibration data.

The procedure to input a custom curve is as follows:

1. Select **Custom Input Curve** from **Calibration** menu.

2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select the number of points you want in your custom curve (2 - 22).

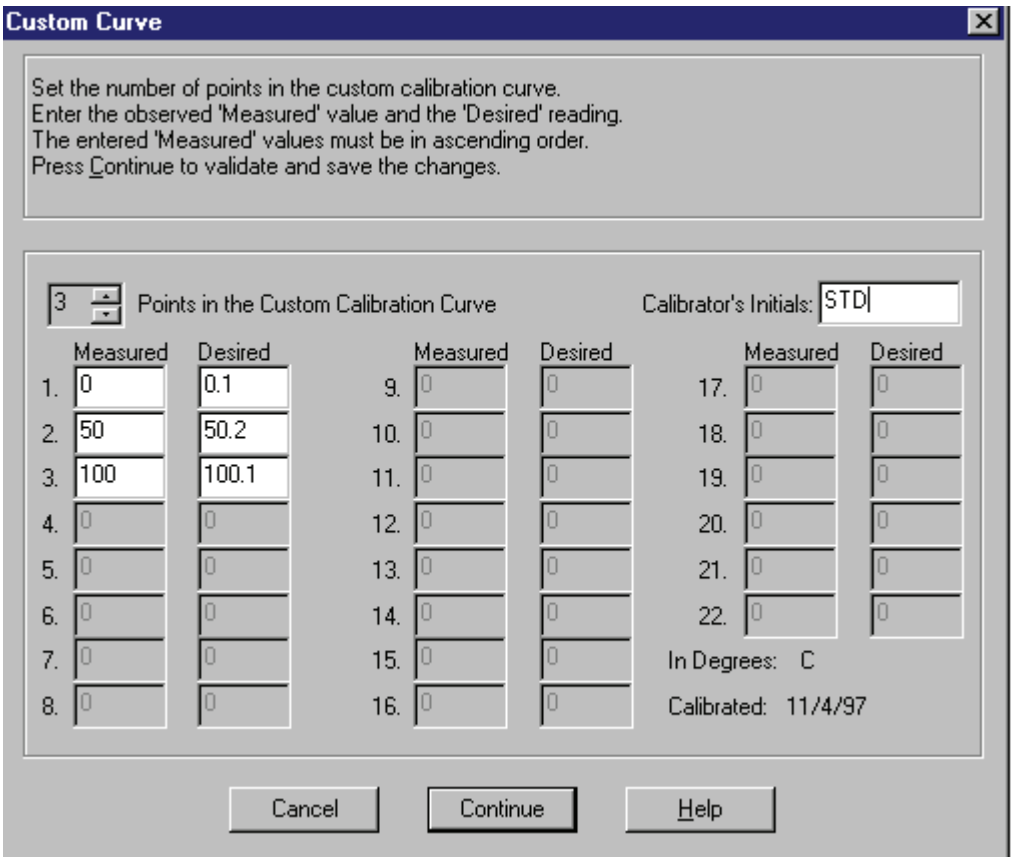


Figure C-3. Sample RTT20 Custom Input Curve Screen

CAUTION

If all the Measured/Desired fields are "0", then the number of points must be "0" prior to exiting the Custom Input Curve screen. If the number of points is not zero (2-22) and no measured/desired data is entered into the fields on the Custom Input Curve screen, the transmitter drives its output to whatever "0" means for that sensor. The transmitter does not respond to any change in input in this condition.

NOTE

The calibration data from any of the above calibration options is stored in the custom curve memory locations. Therefore, if you wish to view or change a specific data point, you can enter the custom curve selection and view, edit, or clear all values.

4. In the **Measured** column, enter the values the RTT20 displays now; in the **Desired** column, enter the values you want displayed. For example, if a **Measured** value was 100.00 but you wanted 100.25, enter 100.00 as the **Measured** number and 100.25 as the **Desired** number.

5. Enter the calibrator's initials and select **Continue**. The current calibration date is automatically displayed.
6. Select **Continue** to save the custom curve to the RTT20 transmitter.
7. Follow the prompt to put the device back into Automatic mode. Press **Continue** to resume dynamic measurements.

ReRange

This function enables you to rerange your device without applying inputs representing temperatures. The procedure to do this is as follows:

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter your desired **Lower Range Value** (LRV) and **Upper Range Value** (URV) and select **Continue**.

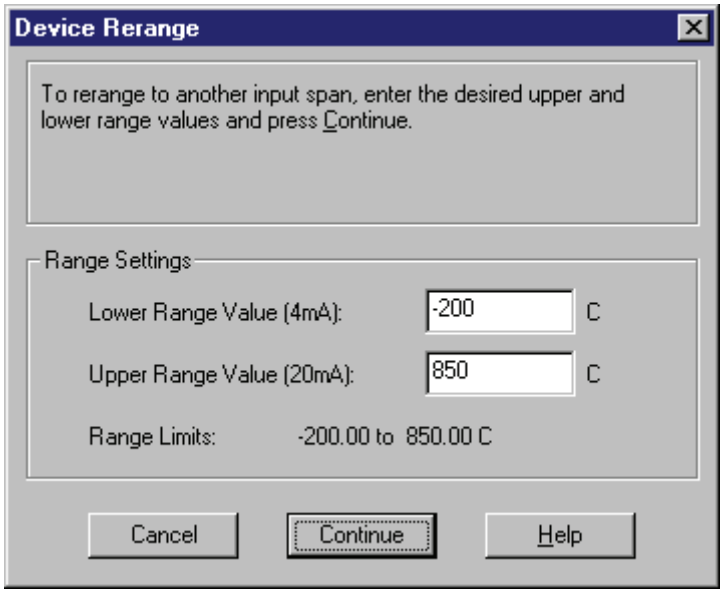


Figure C-4. Sample RTT20 ReRange Screen

4. Select **Continue** to save the new custom curve to the RTT20 transmitter.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory mA

This function restores the mA calibration factory settings. The procedure to do this is as follows:

1. Select **Restore Factory mA** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.

3. To reconfirm that you want to restore the mA calibration factory settings, select **Continue**. The Factory Calibration is restored and the calibration date automatically changes.

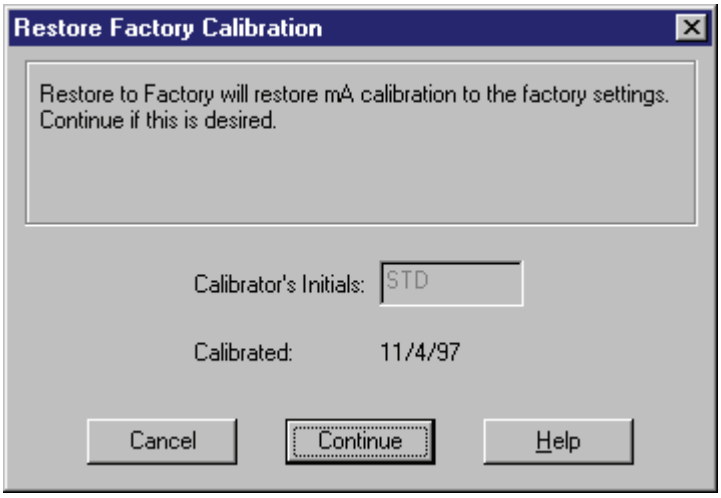


Figure C-5. Sample RTT20 Restore Factory Calibration Screen

4. Enter the calibrator's initials and select **Continue**.
5. Follow the prompt to put the transmitter back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

NOTE

Before performing a mA Calibration, perform the N-Point Calibration procedure described on page 104. A mA calibration may no longer be necessary.

Procedure for a FoxCom Device

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

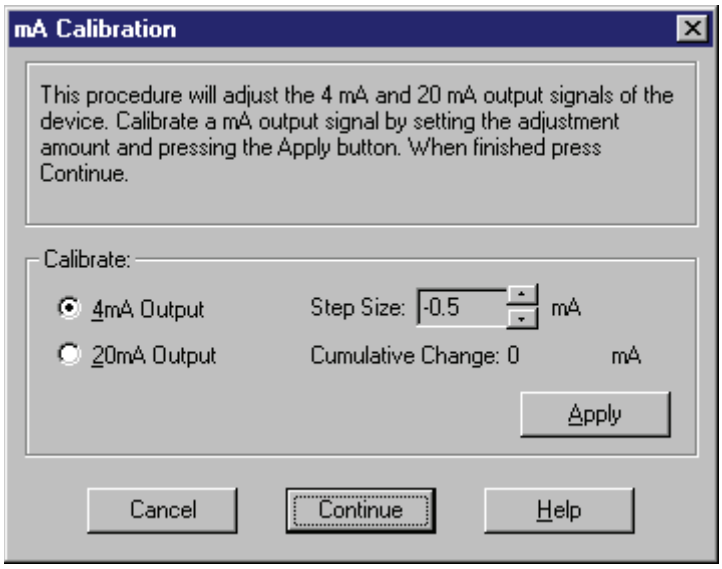

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: -0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure C-6. Sample RTT20 mA Calibration Screen (FoxCom Device)

5. Set **Step Size** from menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Procedure for a HART Device

1. Select the **mA Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **4 mA Output**.

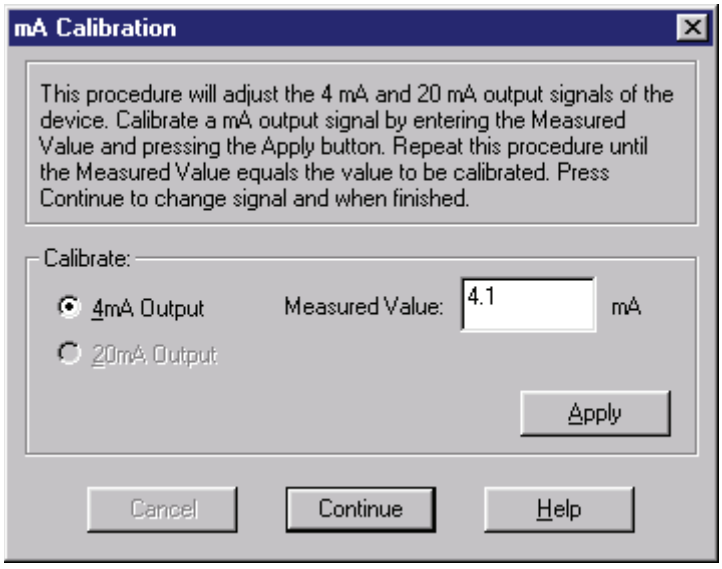

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by entering the Measured Value and pressing the Apply button. Repeat this procedure until the Measured Value equals the value to be calibrated. Press Continue to change signal and when finished.
Calibrate:
4mA Output
Measured Value:
4.1
mA
20mA Output
Apply
Cancel
Continue
Help

Figure C-7. Sample RTT20 mA Calibration Screen (HART Device)

4. Enter the measured value and select **Apply**. Repeat this step until the output matches the measured value.
5. Select **Continue**.
6. Select **20 mA Output**.
7. Enter the measured value and select **Apply**. Repeat this step until the output matches the measured value.
8. Select **Continue**.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

The Identifier screen for a FoxCom device is somewhat different than that for a HART device. A description of each follows.

FoxCom Device

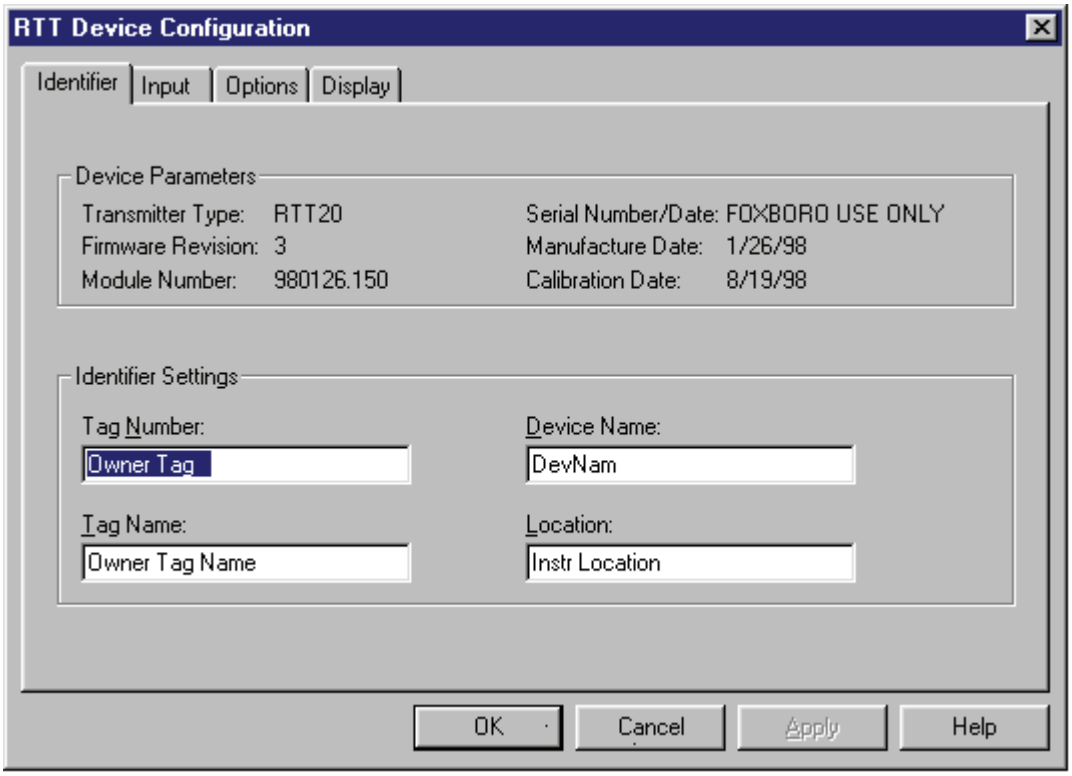


Figure C-8. Sample RTT20 Identifier Tab Screen (FoxCom Device)

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the default transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

HART Device

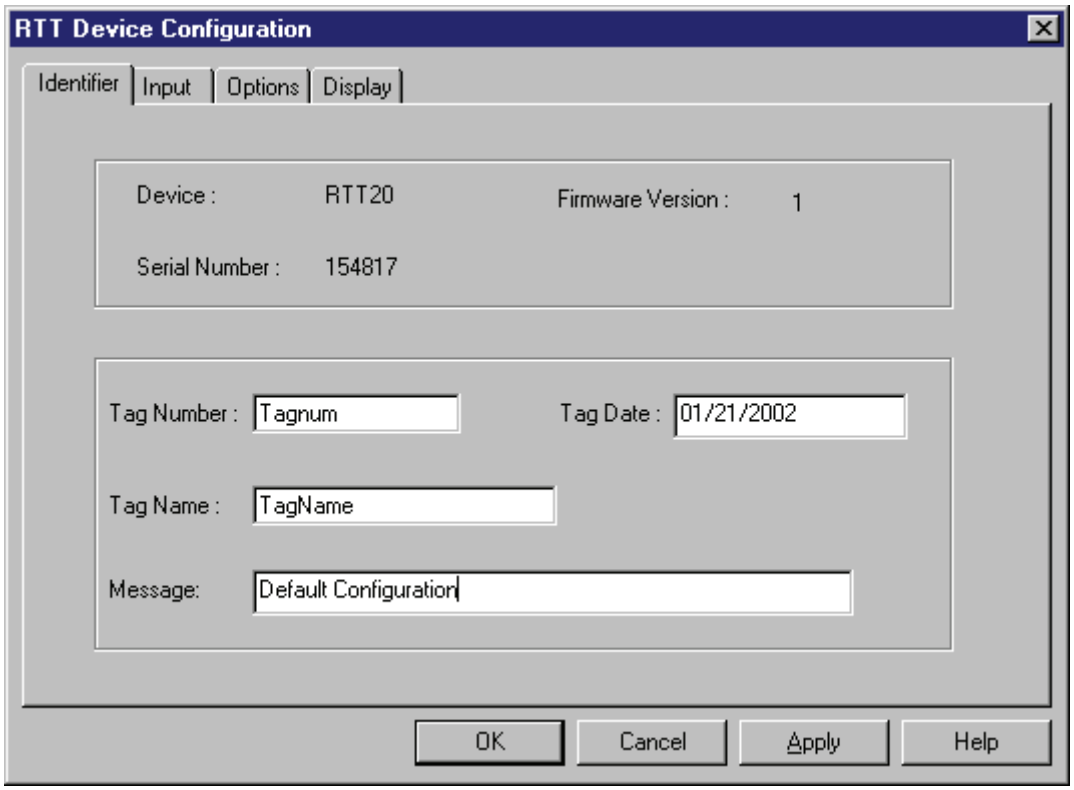


Figure C-9. Sample RTT20 Identifier Tab Screen (HART Device)

Field	Entry
Tag Number	Enter maximum of 8 characters. The tag number becomes the transmitter filename.
Tag Name	Enter maximum of 16 characters. Optional, used for reference only.
Tag Date	Enter a date. It is possible to enter any valid future or past date. For example, this field may be used for storing the date of the last calibration or a future planned maintenance date.
Message	Enter maximum of 32 characters. This field can be used for company internal designations, device numbers for material industry (business), final alignment of device, startup of device, or other purpose.

Input Tab Screen

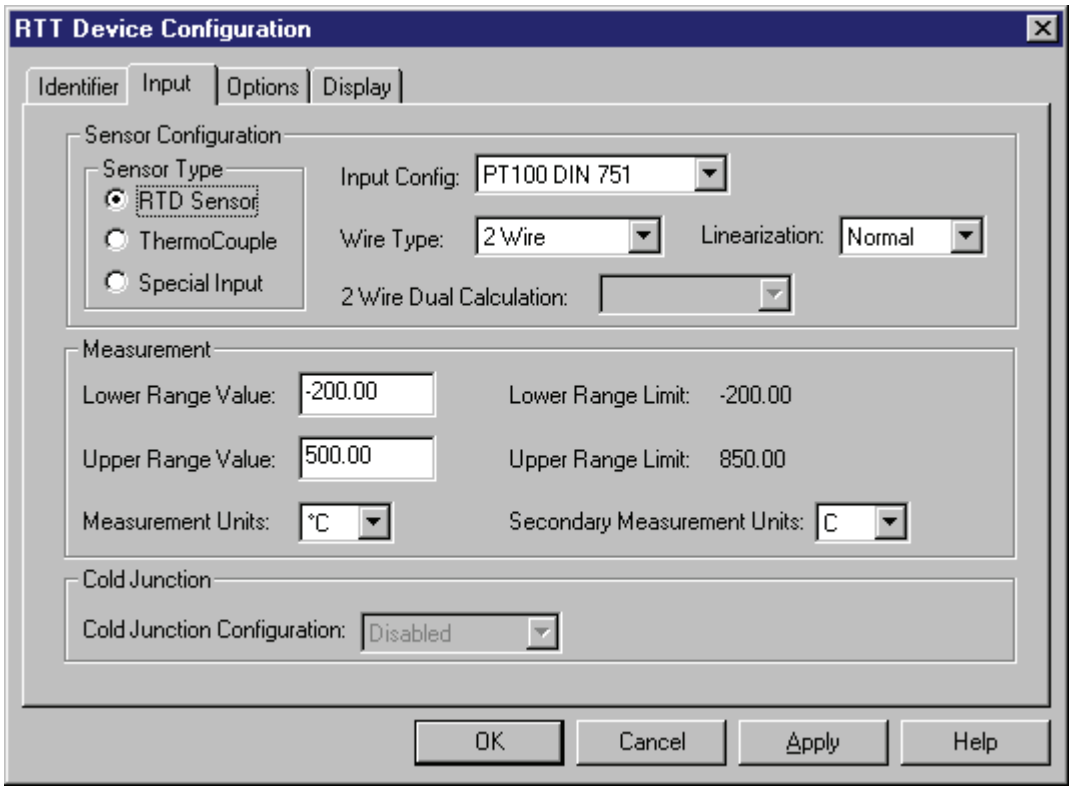


Figure C-10. Sample RTT20 Input Tab Screen

Field	Entry
Sensor Type	Select **RTD Sensor**, **ThermoCouple**, or **Special Input**.
Input Config.	Select from menu of input types.
Wire Type	For RTDs, select from menu of wire types.
Linearization	Select **Normal** or **Dewpoint**.
2-Wire Dual Calculation	For 2-Wire Dual RTD, select **Redundant**, **Average**, or **Difference**.
Lower Range Limit	Shows value of Lower Range Limit of transmitter.
Upper Range Limit	Shows value of Upper Range Limit of transmitter.
Lower Range Value	Enter value at which transmitter outputs 4 mA.
Upper Range Value	Enter value at which transmitter outputs 20 mA.
Measurement Units	Select from menu of units.
Secondary Measurement Units	Select from menu of units.
Cold Junction Configuration	For thermocouples, select **Internal Sensor**, **External Sensor**, **Fixed Value**, or **Disabled**.
Cold Junction Fixed Value	If fixed value, enter value.

Options Tab Screen

FoxCom Device

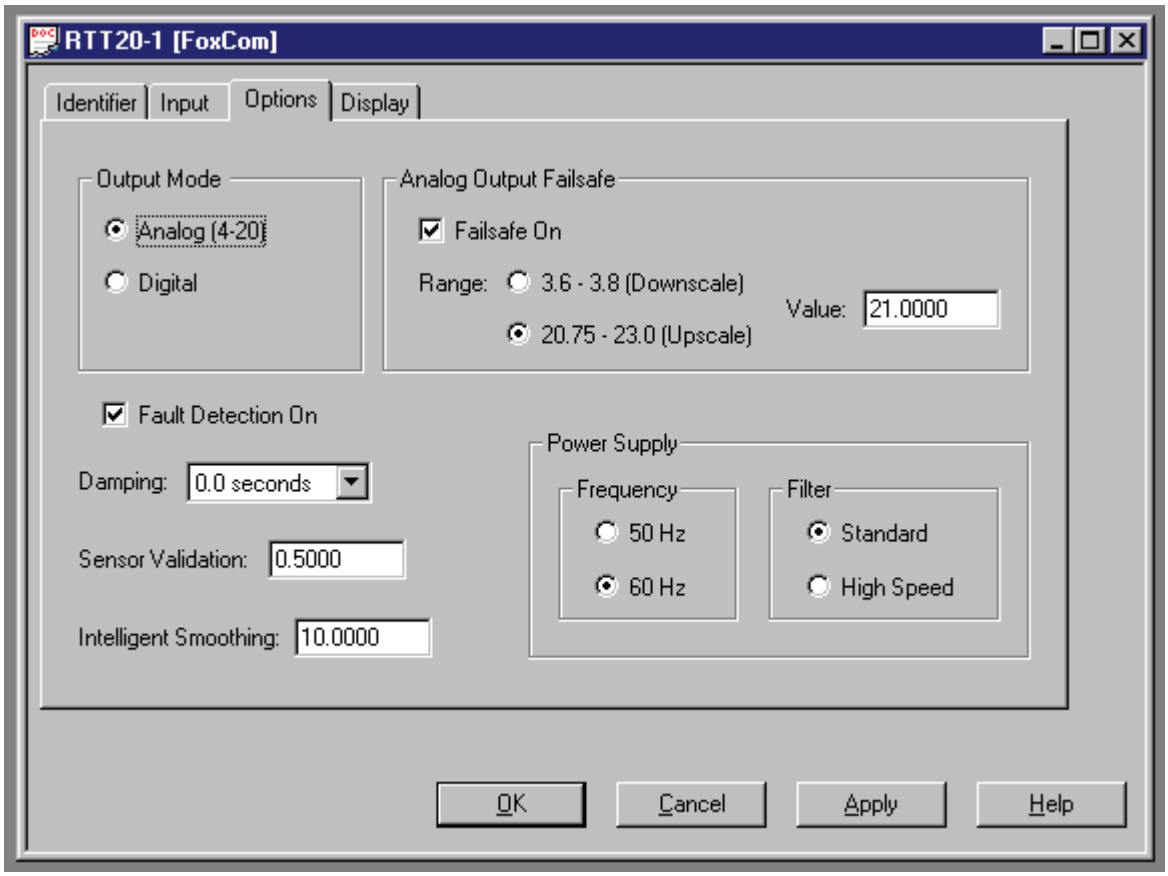


Figure C-11. Sample RTT20 Options Tab Screen (FoxCom Device)

Field	Entry
Output Mode	Select **Analog (4 - 20 mA)** or **Digital**.
Fault Detection On	√ = On; Blank = Off.
Analog Output Failsafe	
Failsafe On	√ = Failsafe On; Blank = Failsafe Off.
Range	If Failsafe is On, select **3.6-3.8 (Downscale)** or **20.75-23.0 (Upscale)**.
Value	Enter value within range selected.
Damping	Select one of nine choices from **No Damping** to **32** seconds.
Sensor Validation	Enter value between 0.25 and 10 seconds.
Intelligent Smoothing	Enter value between 0 and 30 seconds.
Power Supply Frequency	Select **50** or **60 Hz**.
Power Supply Filter	Select **Standard** or **High Speed**.

HART Device

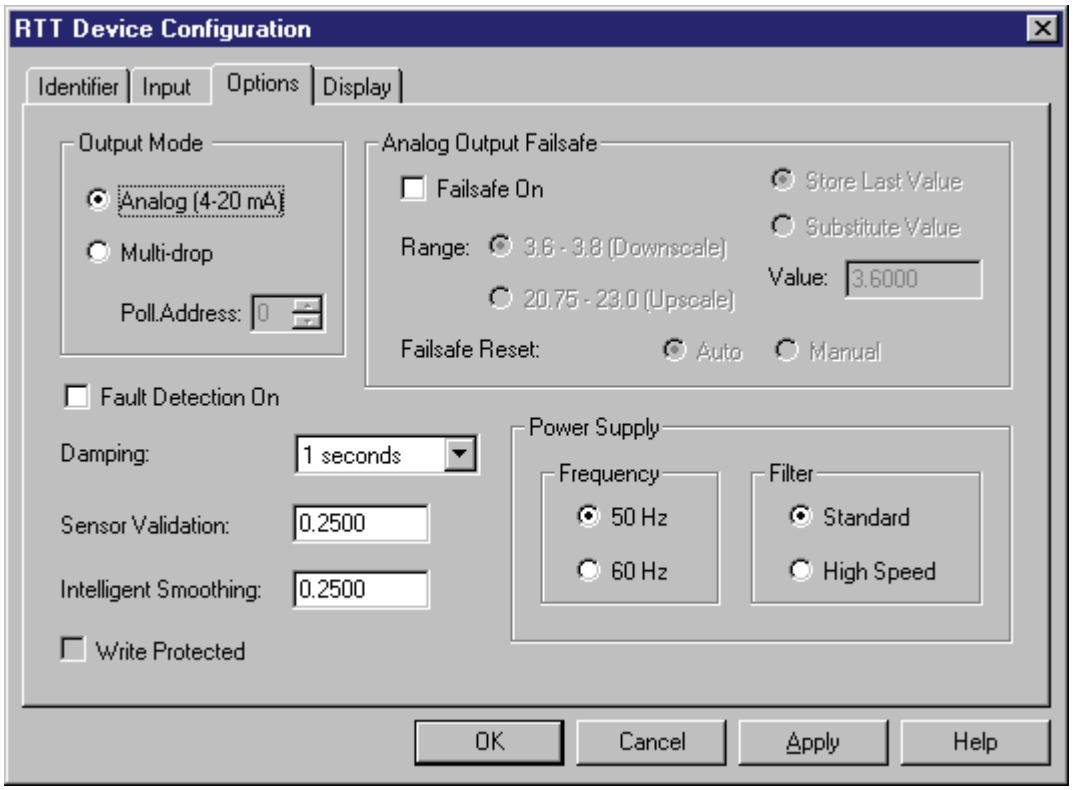


Figure C-12. Sample RTT20 Options Tab Screen (HART Device)

Most of the fields for a HART device are the same as for an RTT20 FoxCom device. The HART device has the following additional fields.

Field	Entry
Output Mode	Select **Analog** or **Multidrop**.
Poll Address	If Multidrop, select address between 1 and 15.
Analog Output Failsafe	
Store Last Value or Substitute Value	Select **Store Last Value** for last valid value or **Substitute Value** for value specified.
Failsafe Reset	Select **Auto** or **Manual**.
Write Protect (Read only)	√ = Write protection; Blank = No write protection.

Display Tab Screen

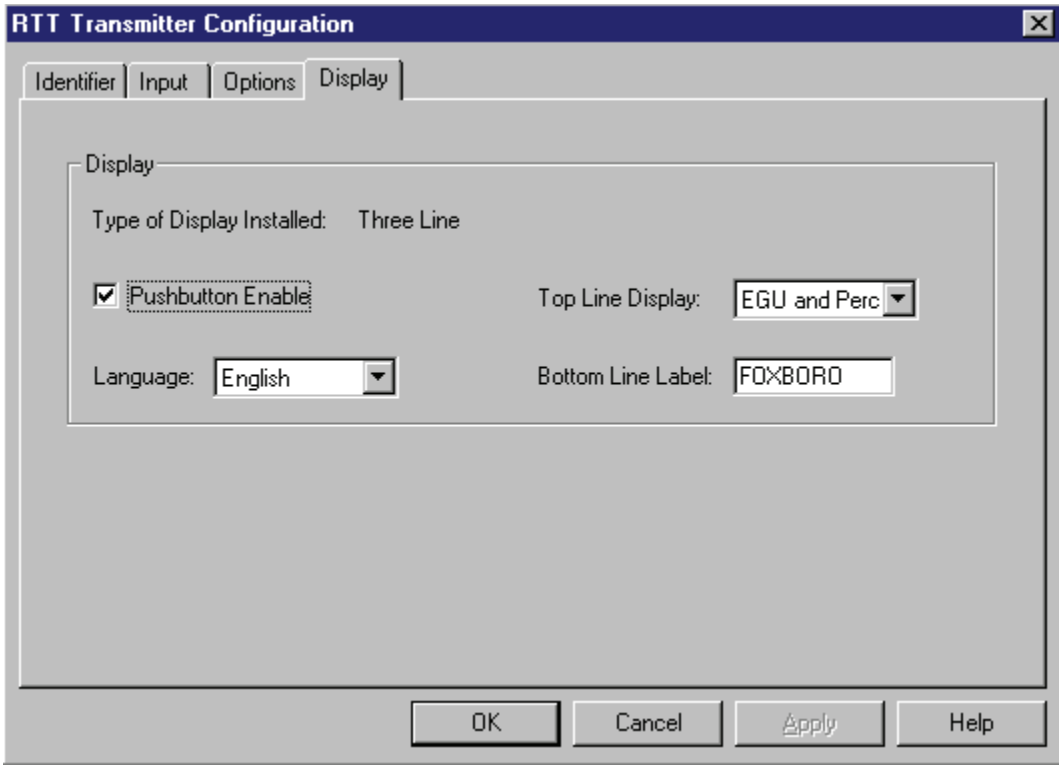


Figure C-13. Sample RTT20 Display Tab Screen

Field	Entry
Type of Display Installed	Shows **None**, **One Line** or **Three Line** indicator installed.
Pushbutton Enable	√ = Enabled; Blank = Disabled.
Language	Select **English**, **French**, **German**, or **Spanish**.
Top Line Display	Select from menu (**EGU**, **Percent of Range**, **mA**, **EGU and Percent**, or **EGU and mA**).
Bottom Line Label	If three-line display, enter maximum of seven characters.

Database Report

Table 19. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	32	Cal Point X3	30
Tag Number	STD2	Cal Point Y3	50
Tag Name	Tag Name	Cal Point X4	0
Device Name	DevNam	Cal Point Y4	0
Geo Location	Location	Cal Point X5	0
Sensor Number	03	Cal Point Y5	0
Upper Range Limit	850	Cal Point X6	0
Lower Range Limit	-200	Cal Point Y6	0
Sensor Validation	0.5	Cal Point X7	0
Failsafe	01	Cal Point Y7	0
Failsafe Value	21	Cal Point X8	0
Local Indic Type	02	Cal Point Y8	0
Local Indic Keys	00	Cal Point X9	0
Local Indic Lang	00	Cal Point Y9	0
Local Indic Disp	02	Cal Point X10	0
Output Mode	01	Cal Point Y10	0
Measurement Units	20	Cal Point X11	0
Intel Smoothing	10	Cal Point Y11	0
Sensor Type	01	Cal Point X12	0
Damping	0	Cal Point Y12	0
URV	850	Cal Point X13	0
LRV	-200	Cal Point Y13	0
Factory Info	FACTORY INFO	Cal Point X14	0
Line Freq Filter	02	Cal Point Y14	0
Sens Fault Detect	00	Cal Point X15	0
Display Label	FOXBORO	Cal Point Y15	0
Serial Number	9472	Cal Point X16	0
Linearization Mode	00	Cal Point Y16	0
Manufacturing Date	5/21/96	Cal Point X17	0
Cal Date	7/14/98	Cal Point Y17	0
Characterization	00	Cal Point X18	0
Calib Initials	STD	Cal Point Y18	0
Device Type	00	Cal Point X19	0
Unused Parameter	11/8/95	Cal Point Y19	0
Unused Parameter	00	Cal Point X20	0
Major Revision Code	01	Cal Point Y20	0
Unused Parameter	18	Cal Point X21	0
Unused Parameter	18	Cal Point Y21	0
Unused Parameter	00	Cal Point X22	0
Primary and Sec EGU	C	Cal Point Y22	0
Secondary Meas Units	20	Cal Offset 4 ma	3133
Number Cal Points	03	Cal Offset 20 ma	3133
Cal Point X1	0	TON Count 4 ma	284.9344

Table 19. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Cal Point Y1	10	TON Count 20 ma	4525.617
Cal Point X2	15	Diag Error Code	00 00
Cal Point Y2	25	Cold Junction Config 00	
		Cold Junction Fixed	0
		Database Change Coun	5e
		FoxCom Turn-around	00

Appendix D. IMT10/IMT20 Magnetic Flow Transmitters

This appendix provides information that is exclusive to the IMT10/20 Magnetic Flow transmitters in regards to the Intelligent Field Device Configurator. It contains information on:

- Device Data Screen
- Device Error Messages
- Calibration
- Configuration
- Sample Database Report.

Device Data Screen

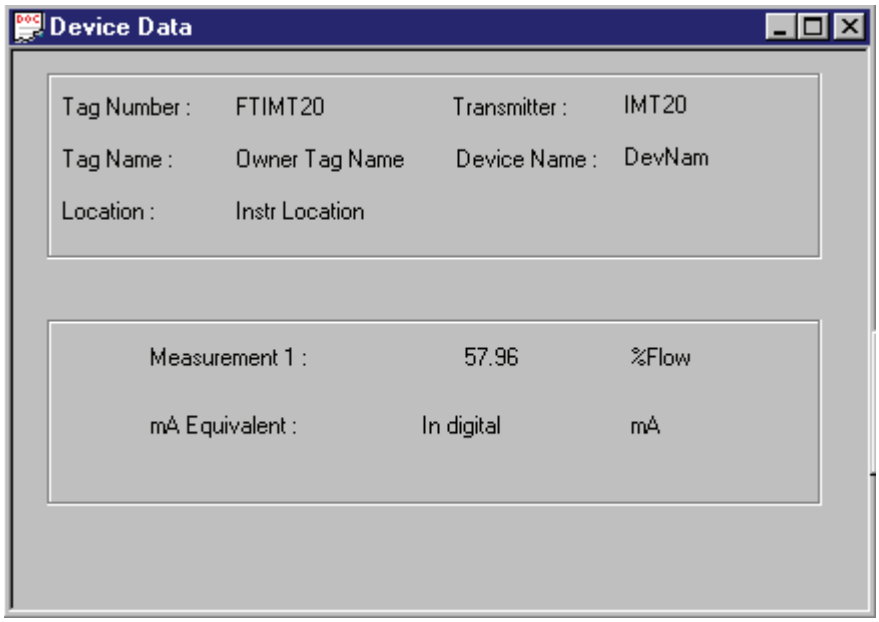


Figure D-1. Sample IMT20 Device Data Screen

Error Messages

Status Error Messages

Table 20. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Initializing	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Error Messages to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Signal Lock Set	External contact is set.	Set by user; no action required.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.

Diagnostic Error Messages

For additional information, see *IMT20 with 8000A, 8300, 2800, and 9300 Transmitters Maintenance* (MI 021-384).

Table 21. Transmitter Diagnostic Error Messages

Code	Error Message	Recommended Action
02	ROM Checksum Error	Contact the CSC.
0C	Hardware Failure	Check line frequency reference voltage per the power supply tests procedure in MI 021-384. If voltage is incorrect, install a new power supply assembly. If voltage is correct, the electronics module may be defective.
0D	ShortWire/BadSwitch	Install new electronics module.
10	Amplifier Bad	Install new electronics module.
11	Amplifier Bad	Install new electronics module.
12	Coil/Amp/Electrodes	Check if the correct flowtube size is being used for the process flow range. If correct, rerange the transmitter for greater flow rate. Check for a buildup of material in the flowtube. If present, clean inside of the flowtube.

Table 21. Transmitter Diagnostic Error Messages (Continued)

Code	Error Message	Recommended Action
13	Electrodes/Wiring	See if a buildup of material on the electrodes has occurred. If so, clean the inside of the flowtube. If not, check the electrodes and replace if defective.
14	OpenWire/Coil/LoDrve	Check the coil wire connections. If the connections are OK, disconnect the coil drive wires from the transmitter and measure the resistance between the wires. It should be between 1 and 100 Ω. Also measure the resistance between each wire and ground. It should be infinite. If the resistance values are correct, the transmitter power supply or electronics module may be defective. If the fault cannot be determined and the transmitter is integrally mounted to the flowtube, the flowtube coils are probably defective. If the transmitter is remotely mounted from the flowtube, verify that the coil drive wires are securely connected. If the fault cannot be determined, disconnect the coil wires from the terminals and measure the resistance between the terminals. It should be between 1 and 100 Ω. Then verify that the resistance between each terminal and ground is infinite. If any resistance is incorrect, the flowtube coil is probably defective. If the resistances are correct, install new coil drive wires between the flowtube and transmitter. For installation details, refer to *IMT20 with 8000A and 8300 Transmitters Installation* (MI 021-382).
1B	External RAM Bad	Install a new electronics module.
20	Under Range	Fill the flowtube with process liquid. Verify that the conductivity is ≥ 5 µS/cm.
21	Over Range	Verify that the correct flowtube is being used for the process flow range. If correct, rerange the transmitter for greater flow rate.
22	Over Range	Verify that the correct flowtube is being used for the process flow range. If correct, rerange the transmitter for greater flow rate.
30	Factory Data Lost	Install a new electronics module.
31	Invalid P1-P5 Data	Check configuration. Reconfigure if necessary.

Calibration

You can perform the following calibration procedures on an IMT10/IMT20 transmitter using the Intelligent Field Device Configurator:

- ReRange
- mA Calibration.

ReRange

This function permits you to change the Flow Upper Range Value (URV) and the Display Upper Range Value without applying flow to the transmitter.

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.

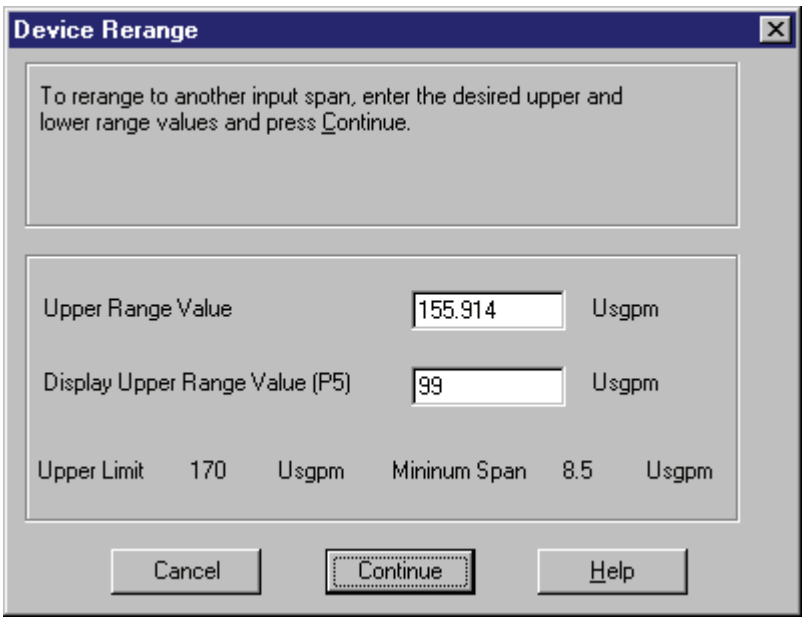


Figure D-2. Sample IMT20 ReRange Screen

3. Enter the new Upper Range Value. Note that the new value cannot exceed the value shown in the bottom left corner of the window nor can it be a value that would yield a span less than the minimum span shown in the bottom right corner of the window. Select **Continue**.
4. Select **Continue** again to save the new range to the device.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

The procedure to perform a mA Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

4. Select **4 mA Output**.

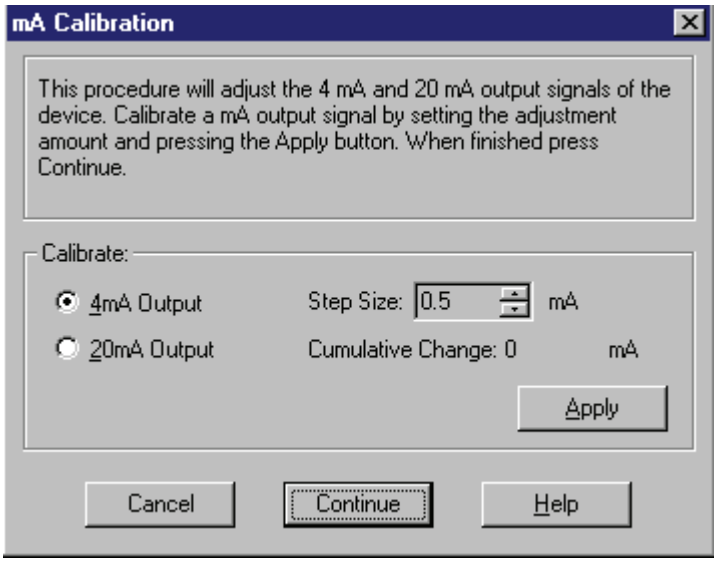

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure D-3. Sample IMT20 mA Calibration Screen

5. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

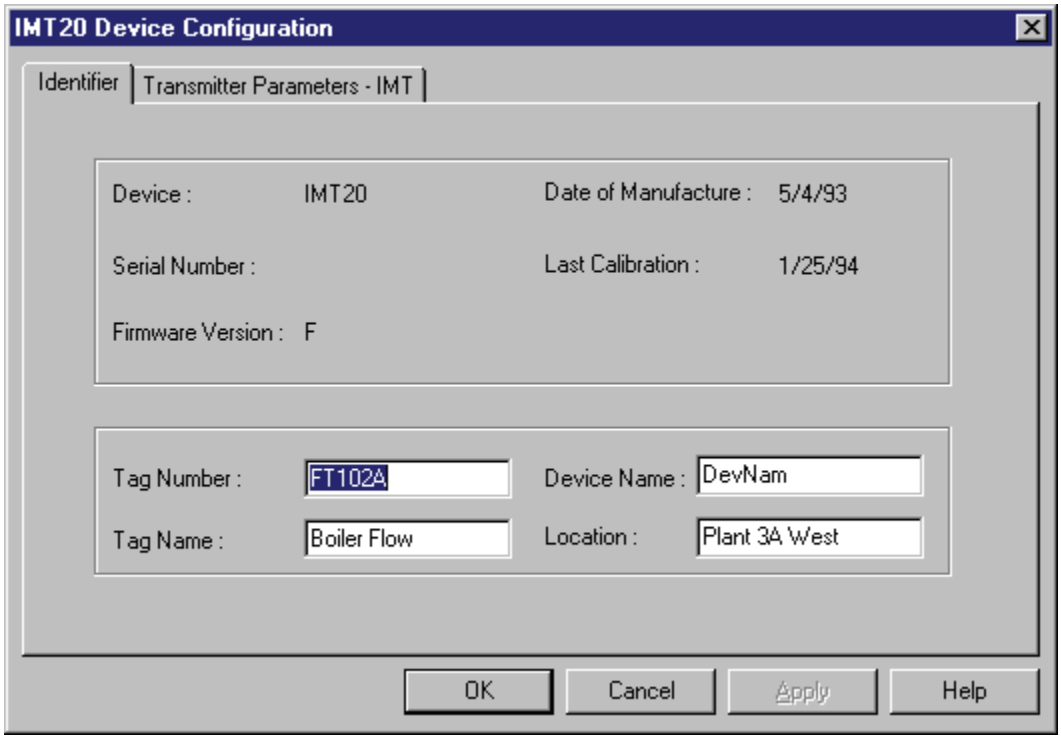


Figure D-4. Sample IMT20 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Transmitter Parameters IMT Tab Screen

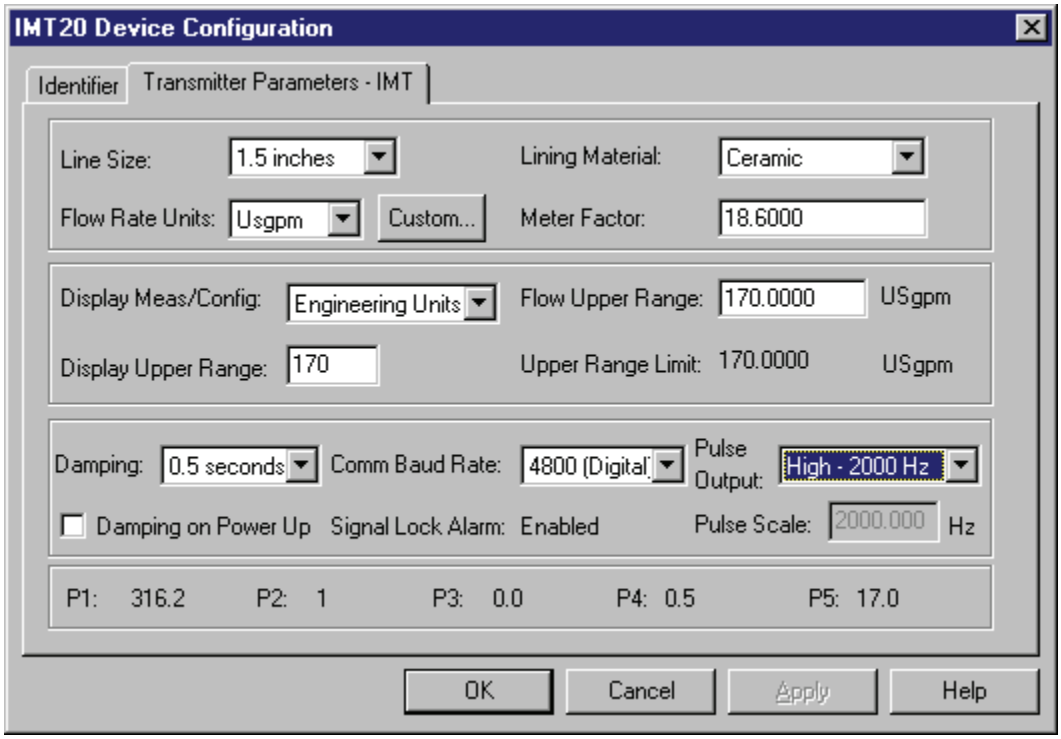


Figure D-5. Sample IMT20 Transmitter Parameters IMT Tab Screen

Field	Entry
Line Size	Select nominal diameter of flowtube from menu of choices.
Flow Rate Units	Select from menu of units or **Custom**. If **Custom**, enter the conversion factor from USGPM to the Custom unit.
Lining Material	Select **Ceramic** or **ptfe** (Teflon).
Meter Factor	Enter "Cal Factor" from flowtube data plate.
Display Meas/Config	Select from menu of choices.
Display Upper Range	Enter Upper Range Value of display.
Flow Upper Range	Enter Upper Range Value in units shown.
Upper Range Limit	Shows Upper Range Limit of device.
Damping	Select **Auto** or any one of eight specific values from 0.20 to 32 seconds.
Damping on Power Up	√ = Enabled; Blank = Disabled.
Comm Baud Rate	Select from menu of choices.
Signal Lock Alarm	Shows **Enabled** or **Disabled**.
Pulse Output	Select **High-2000 Hz** or **Low Variable**.

Field	Entry
Pulse Scale	Enter value between 0.1 and 9.999 Hz if Pulse Output is Low-Variable. This is the output in pps when the flow rate through the tube is equal to the **Flow Upper Range** value.

Database Report

— NOTE

If a parameter in the report is "UNUSED," the corresponding value shown has no meaning for that device.

Table 22. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	2a	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Tag Number	FT102A	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Tag Name	Boiler Flow	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Device Name	DevNam	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Geo Location	Plant 3A West	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Meas #1 Units	Usgpm	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Meas #2 Units	UNUSED	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Flow Upper Range	155.914	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Flow Lower Range	0	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Upper Range Limit	170	UNUSED	00 00 00 00 00 00 00 00 00 00 00 00
Lower Range Limit	0	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED	0	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED	0	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED	UNUSED	UNUSED	00 00 00 00 00 00 00 00 00
UNUSED	UNUSED	UNUSED	00 00 00 00 00 00 00 00 00
Last Calib Date	1/25/94	UNUSED	00 00 00 00 00 00 00 00 00
Sensor Mfg Date	5/4/93	0	
Scale Factor (P1/P2) 29000	UNUSED	UNUSED	0
Display Upper Range	99	UNUSED	0
UNUSED	0	UNUSED	0
Sensor Id Number	01 00	UNUSED	0
Sensor MS Code	2b	UNUSED	0
Device Type	2a	UNUSED	0
Manufacture Date	5/4/93	0	
Minor Revision Code	2b	0	
Major Revision Code	05	UNUSED	0
Max Request Length	8192	UNUSED	0
Max Reply Length	8192	0	
Max Param Number	5b	UNUSED	0
TON Count (4 mA)	3640	UNUSED	0
TON Count (20 mA)	16355	UNUSED	0

Table 22. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Misc. Flags	70	Line Size	1.5
UNUSED	00	UNUSED	0
Database Chng Cntr	31	Meter Factor	18.6
UNUSED	2f	Pulse Scale	0
UNUSED	07	UNUSED	0
UNUSED	00	UNUSED	0
UNUSED	01	UNUSED	0
UNUSED	c4	mA Percent	0.1495387
UNUSED	09	mA LRV	5.447178
UNUSED	cc	Damping (x10)	5
UNUSED	39	Width	89
UNUSED	60	P1	2900
UNUSED	1.542549e-041	P2	1
UNUSED	0	Gamma	20615
UNUSED	0	Offset	0
UNUSED	0	Alpha	20538
UNUSED	0	Filter	4155
UNUSED	0	UNUSED	00
UNUSED	0	Comm Turnaround	01
UNUSED	0	Diag Error Code	00 00
UNUSED	00 00	UNUSED	0
UNUSED	0	UNUSED	0
UNUSED	0	N_A	00 00 00 00 00 00 00 00 00
UNUSED	0	EEPROM Checksum	0

Appendix E. IMT25 Magnetic Flow Transmitters

This appendix provides information that is exclusive to the IMT25 and IMT25L Magnetic Flow transmitters in regards to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Device Error Messages
- Calibration
- Pulse Preset
- Configuration
- Database Report.

NOTE

Version 2.0 of the IFDC/PC20 software incorporates full configuration capability for the HART IMT25 transmitters. Any HART IMT25 database saved to your computer hard disk for Version 1.0 is not usable for Version 2.0. Therefore, delete Version 1.0 files and save new files from your transmitter using Version 2.0 software.

Device Data Screen

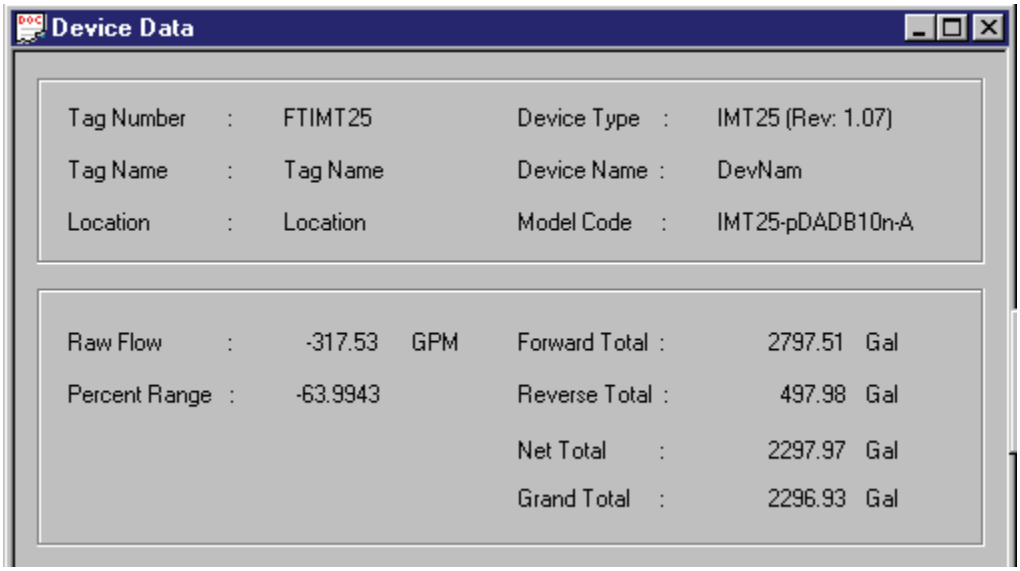

Device Data
Tag Number : FTIMT25
Tag Name : Tag Name
Location : Location
Device Type : IMT25 (Rev: 1.07)
Device Name : DevNam
Model Code : IMT25-pDADB10n-A
Raw Flow : -317.53 GPM
Percent Range : -63.9943
Forward Total : 2797.51 Gal
Reverse Total : 497.98 Gal
Net Total : 2297.97 Gal
Grand Total : 2296.93 Gal

Figure E-1. Sample IMT25 Device Data Screen

Error Messages

FoxCom Device

Table 23. Transmitter Status Error Messages (FoxCom Devices)

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Initializing is required.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Signal Lock Off	External contact is off.	Set by user; no action required.
Error in Startup	Transmitter cannot exit its boot code.	Correct Diagnostic Error or Secondary Status Error also displayed.
Empty Tube Error	Pipe is empty.	See "Empty Pipe Detection" in *IMT25 I/A Series Magflow Transmitters* (MI 021-390).
Electrode Error	Unreliable measurement of electrode voltage.	See Extended Status - Hardware below.
Coil Error	Unreliable measurement of coil current.	See Extended Status - Hardware below.
Extended Status - Hardware		
Coils		
Coil Low	Transmitter unable to generate a reliable measurement of coil current.	Check coil wiring at flowtube and transmitter.
Coil High		Service is required.
Coil Unstable		Cycle power. If the problem persists, service is required.
Positive Coil Needed		Check wiring and flowtube coil.
Negative Coil Needed		
Empty Pipe		
Unable to Calibrate	Unable to calibrate.	Verify that piping is empty. Check flowtube and transmitter wiring.
EPD Calibration Failed	Error during calibration.	Verify that EPD parameter is turned on.

Table 23. Transmitter Status Error Messages (FoxCom Devices) (Continued)

Message	Explanation	Recommended Action
Electrodes		
Electrode Low	Transmitter unable to generate a reliable measurement of electrode voltage.	Check signal wiring between flowtube and transmitter. Also see *Magnetic Flow Transmitters Models IMT25-D and IMT25-T with FoxCom (-D) or HART (-T) C...* (MI 021-391).
Electrode High		
Electrode Unstable		
Positive Electrode Needed		
Negative Electrode Needed		
Setup		
MultiRange Setup	Setup needed.	Check that Configuration and Contact Inputs 1 and 2 are set up properly.
Extended Status - Process		
Process Problems		
Signal Lock	Signal lock is on.	Check that Contact Inputs 1 and 2 are activated by an external set of contacts or switch.
Pulses Lag Total	Totalizer putting out pulses at the maximum rate but falling behind the actual total.	Reconfigure totalizer display so that each pulse represents a larger volume.
Total Rollover	Total exceeds limit of configured format.	Reconfigure total format if necessary and reset totals.
A to D Calibration Failed	Electronics problem.	Service is required.
Alarms		
High Flow	Flow above configured high flow rate.	Make process change or reconfigure alarm setpoint.
Low Flow	Flow below configured low flow rate.	
High Forward Total 1	Total above configured High Fwd Tot 1.	Make process change or reconfigure Tot Alm Setpt and reset totals.
High Forward Total 2	Total above configured High Fwd Tot 2.	
Empty Pipe	Transmitter thinks pipe is insufficiently full to make measurements.	Make process change or, if not empty, check wiring and recalibrate.

HART Device

Table 24. Transmitter Status Error Messages (HART Devices)

Message	Explanation	Recommended Action
HART Status		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Device Malfunction	Severe problem.	Check the other status bits.
Configuration Changed	The configuration of the transmitter has been changed.	This flag can be reset with the menu item **Reset Changed Flag.**
Cold Start	Device rebooted.	Check power supply.
Output Current Fixed	The output current is fixed. The reason might be that it is in the fail-safe state. This flag is also set when the HART device is in multidrop mode.	The Device Specific Status may show the reason for the fail-safe state.
Analog Output Saturated	Analog Output out of 4 to 20 mA range.	The Primary Value (PV) exceeds the configured range. Check range limits.
Nonprimary Variable Out of Limits	Not applicable to the IMT25 transmitter.	
Primary Variable Out of Limits	Sensor signal out of limits.	Check device specific status and applied process value.
Device Specific Status		
Active Diagnostic	Tells whether an active diagnostic condition exists or not.	Check Additional Status 1 and 2.
Prior Diagnostic	Tells whether a prior diagnostic condition existed.	Using the transmitter key pad to obtain additional information about the diagnostic. Use the Test menu to clear.
Alarm Hi Flow Flag	Flow above configured high flow rate.	Make process change or reconfigure alarm setpoint.
Alarm Lo Flow Flag	Flow below configured low flow rate.	
Alarm EP Flag	Fluid level in the pipe is below the flowtube electrodes.	If pipe is full, check electrode wiring and repeat AZL calibration.
Alarm Total 1 Flag	Total above configured High Fwd Tot 1.	Make process change or reconfigure Tot Alm Setpt and reset totals.
Alarm Total 2 Flag	Total above configured High Fwd Tot 2.	

Table 24. Transmitter Status Error Messages (HART Devices) (Continued)

Message	Explanation	Recommended Action
AZL Detector	Reports AZL Status: Off (not in use), Empty Pipe, Not Empty (normal condition).	
Auto Zero Lock	Reports AZL effect on outputs: Locked (output locked), Not Locked (normal condition), Disabled (not configured).	
Signal Lock	Ext. contact signal lock status: Locked (output locked), Not Locked (normal condition), Disabled (not configured).	
Digital Owner	Reports what function has control of the output.	
m/A Owner		
Pulse Owner		
Additional Status 1		
Measurement invalid		
Input out of range	Flow Rate above or below URV.	Review configuration of URV and Direction.
Transmitter mode invalid	Transmitter is in off-line condition.	Transmitter may have been put in off-line condition via the keypad or HART communicator. If not, cycle power.
Inconsistent configuration	Configuration error exists.	Review configuration for error messages and make required changes.
Coil problem	Transmitter unable to generate a reliable measurement of coil current.	Check coil wiring at flowtube and transmitter. Cycle power. If the problem persists, service is required.
Loop problem		
Transmitter failed	Transmitter error.	Cycle power. If problem still exists, service is required.
Novram error	Novram error.	Cycle power. If problem still exists, service is required.
Additional Status 2		
Alarms exist	An alarm exists.	See Device Specific Status.
Signal Locked	Signal lock is on.	Check that Contact Inputs 1 and 2 are activated by an external set of contacts or switch.
AZL Active		

Table 24. Transmitter Status Error Messages (HART Devices) (Continued)

Message	Explanation	Recommended Action
Total Rollover	Total exceeds limit of configured format.	Reconfigure total format if necessary and reset totals.
Pulses Lag Total	Totalizer putting out pulses at the maximum rate but falling behind the actual total.	Reconfigure totalizer display so that each pulse represents a larger volume.
Electrode Error	Unreliable measurement of electrode voltage.	Check signal wiring between flowtube and transmitter. Also see MI 020-391.
Analog Output Fixed		
Analog Output Fixed		

Calibration

You can perform the following calibration procedures on an IMT25 transmitter using the Intelligent Field Device Configurator:

- mA Output
- Reset Totals
- Empty Pipe.

Empty Pipe

The empty pipe detector can be used to force the transmitter outputs to stay at zero when the flowtube is empty. The empty pipe circuit must be calibrated to the fluid in the flowtube. The flowtube must be full of process fluid (flowing or still) to use this calibration procedure. The calibration procedure leaves the empty pipe detector in the ON condition. The detector can be turned off in the Configuration menu.

1. Select **Empty Pipe** from the **Calibration** menu or the Empty Pipe icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Fill the flowtube and then select **Continue** to start the Empty Pipe Calibration process.
4. Wait while the device is calibrating.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Output

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

FoxCom Device

The procedure to perform a mA Output Calibration on a FoxCom device is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Output** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.
5. Set the **Step Size** (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

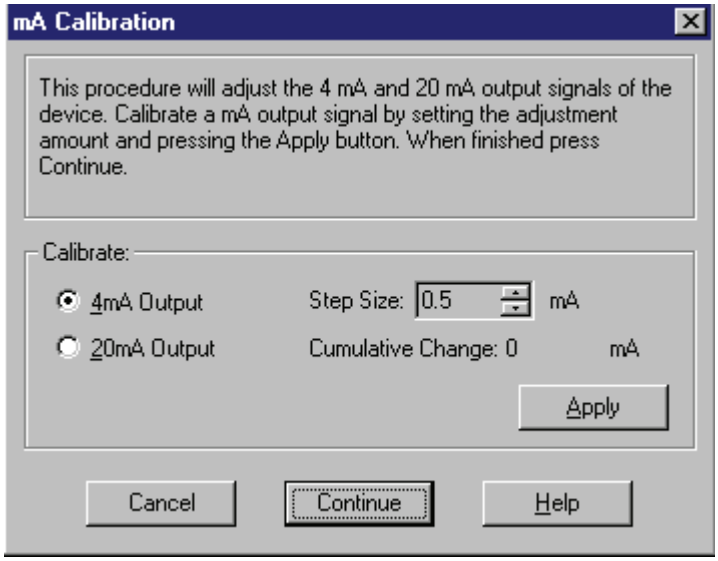

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5 mA
Cumulative Change: 0 mA
Apply
Cancel
Continue
Help

Figure E-2. Sample IMT25 mA Calibration Screen (FoxCom Device)

HART Device

The procedure to perform a mA Output Calibration on a HART device is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

5. Enter the value from the mA meter in the **Measured Value** field on your screen and select **Apply**.
6. Repeat Step 4 until the **Measured Value** equals the value on the meter.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5.
9. Select **Continue** to save the calibration to the transmitter.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

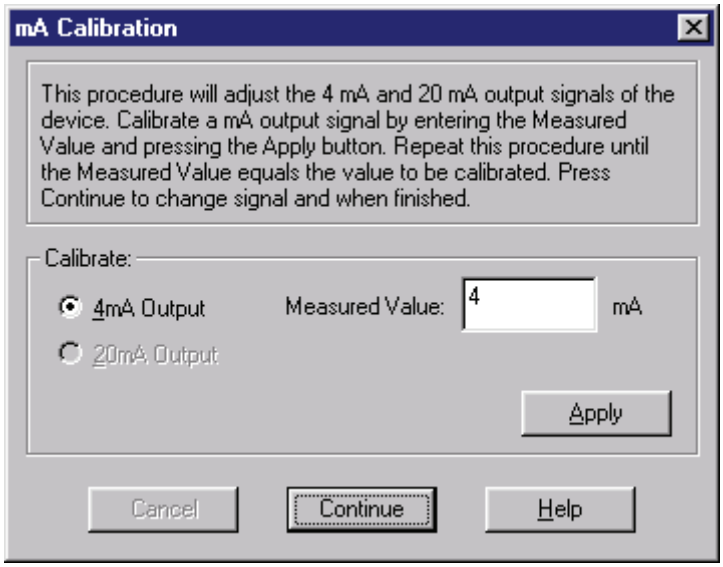

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by entering the Measured Value and pressing the Apply button. Repeat this procedure until the Measured Value equals the value to be calibrated. Press Continue to change signal and when finished.
Calibrate:
4mA Output
20mA Output
Measured Value:
4
mA
Apply
Cancel
Continue
Help

Figure E-3. Sample mA Calibration Screen (HART Device)

Reset Totals

This procedure resets the transmitter totals. The **Net, Forward and Reverse Totals** are reset as a group. The **Grand Total** is individually reset.

1. Select **Reset Totals** from the **Calibration** menu or the Reset Totals icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select the device total(s) to reset to zero. You can select **Net, Forward, and Reverse Totals** or **Grand Total**. Then select **Continue**.

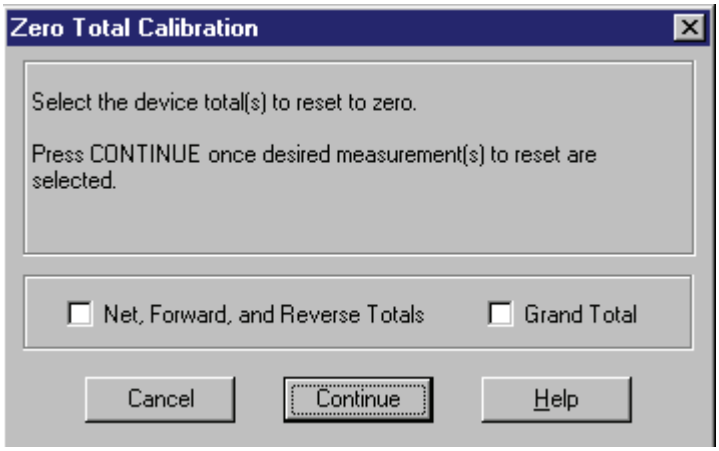


Figure E-4. Sample IMT25 Reset Totals Screen

4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Pulse Preset

1. Select **Pulse Preset** from the **Test** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter a value to set as the pulse rate and select **Apply**.
4. Select **Continue** when done testing.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

Reset Change Flag

This function clears the **Configuration Changed** flag and the historical status information of the device. It is accessed via the **Test** menu from the device top level menu.

Master Reset

The execution of this function causes the transmitter to do a master reset. This takes about four seconds. During this time the device is not able to respond to any command until the execution is complete and the transmitter latches the output on the last value. The Master Reset function is accessed via the **Test** menu from the device top level menu.

Acknowledge Alarms

This function enables you to acknowledge an alarm. It is accessed via the **Test** menu from the device top level menu.

Acknowledge Prior Diagnostic

This function enables you to acknowledge a diagnostic message. It is accessed via the **Test** menu from the device top level menu.

Configuration

NOTE

For IMT25L devices, some configuration parameters do not apply.

Identifier Tab Screen

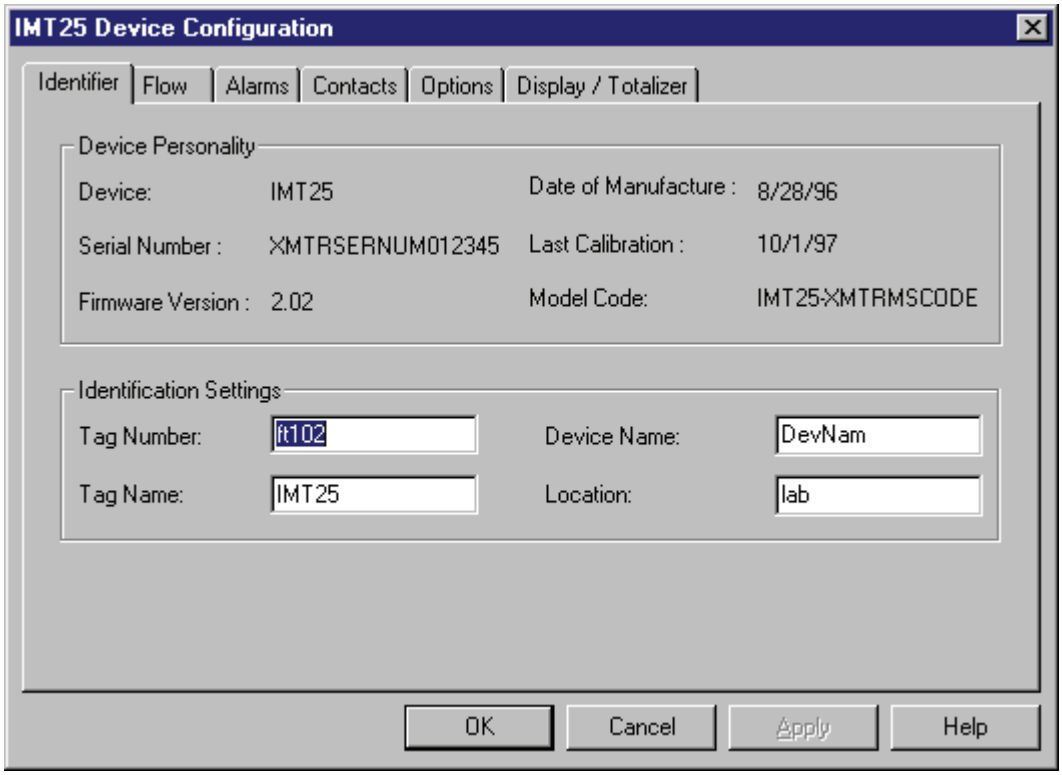


Figure E-5. Sample IMT25 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. (Not applicable to HART device). NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Flow Tab Screen

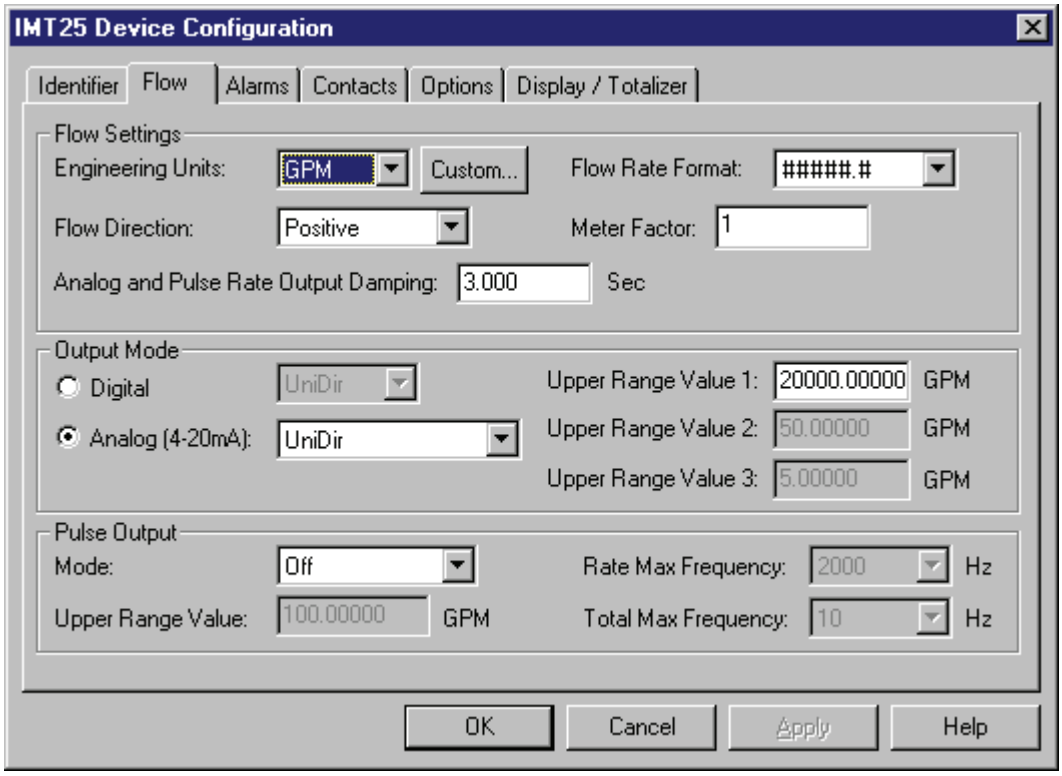


Figure E-6. Sample IMT25 Flow Tab Screen

Field	Entry
Flow Settings	
Engineering Units	Select from menu of choices or **Custom**.
Flow Direction	Select **Positive**, **Reverse**, **BiDir Positive**, or **BiDir Reverse**.
Analog and Pulse Rate Output Damp.	Enter damping response time from 0.0 to 99.9 seconds.
Flow Rate Format	Select from menu of eight choices.
Meter Factor	Enter "IMT25 Cal Fact" or "Cal Fact*" factor. See *IMT25 I/A Series Magflow Transmitters* (MI 021-390).
Output Mode	
Digital	Select **UniDirectional** or **BiDirectional** flow (not applicable to HART device).
Analog	Select **UniDirectional**, **Unidirectional Multi-Range**, **BiDirectional Dual Range**, or **BiDirectional Split Range**.
Upper Range Values	Enter Upper Range Values in units shown.
Pulse Output	
Mode	Select **Off**, **Pulse Rate**, or **Pulse Total**.

Field	Entry
Upper Range Value	If Pulse Rate mode, enter Pulse Out URV between minimum and maximum URV of the flowtube (not greater than 999999).
Rate Max Frequency	If Pulse Rate mode, select **Rate Max Frequency** of **1000**, **2000**, **5000**, or **10000** Hz.
Total Max Frequency	If Pulse Total mode, select **Total Max Frequency** of **10** or **100** Hz.

Alarms Tab Screen

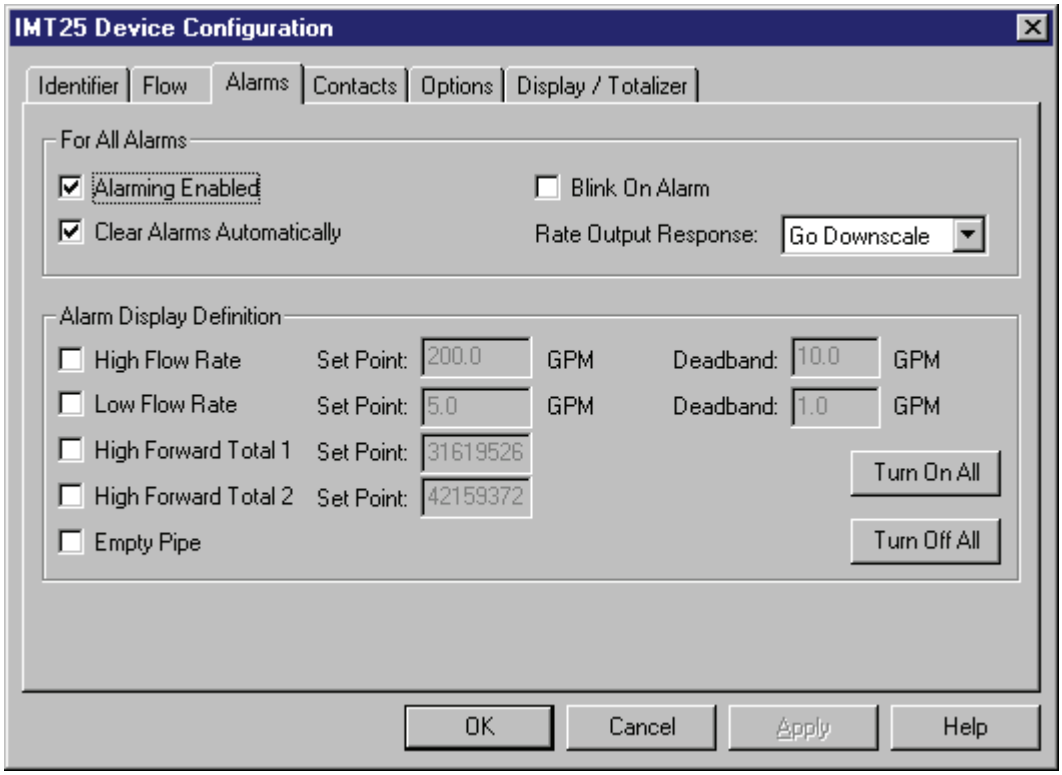


Figure E-7. Sample IMT25 Alarms Tab Screen

Field	Entry
For All Alarms	
Alarming Enabled	√ = On; Blank = Off.
Clear Alarms Automatically	√ = Auto; Blank = Manual.
Blink On Alarm	√ = Blink; Blank = Don't Blink.
Rate Output Response	Select **No effect**, **Go Downscale**, or **Go Upscale**.
Alarm Display Definition	
High Flow Rate	√ = On; Blank = Off. If On, enter Set Point and Deadband.
Low Flow Rate	√ = On; Blank = Off. If On, enter Set Point and Deadband.

Field	Entry
High Forward Total 1	√ = On; Blank = Off. If On, enter Set Point.
High Forward Total 2	√ = On; Blank = Off. If On, enter Set Point.
Empty Pipe	√ = On; Blank = Off.
Turn On All	Turns all alarms on.
Turn Off All	Turns all alarms off.

Contacts Tab Screen

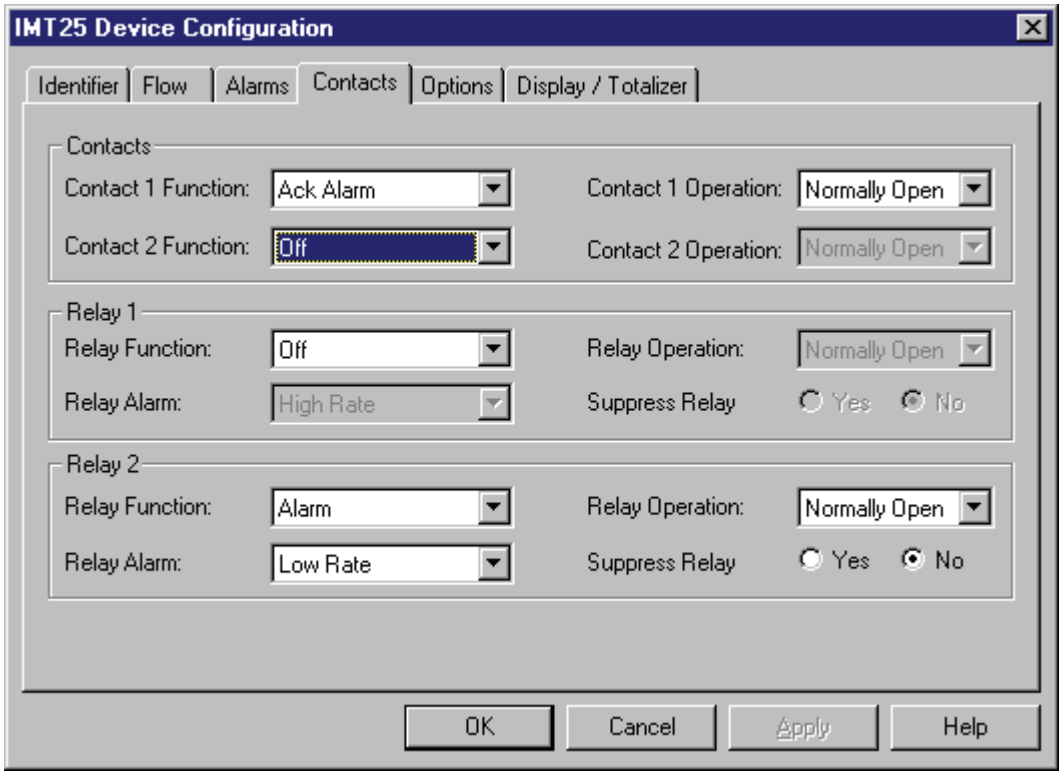


Figure E-8. Sample IMT25 Contacts Tab Screen

Field	Entry
Contacts	
Contact 1 Function	Select **Off**, **Ack Alarm**, **Reset Net Total**, **Reset Gr Total**, **Reset All Total**, **Multi-range**, or **Signal Lock**.
Contact 1 Operation	If **Contact 1 Function** is not **Off**, select **Normally Open** or **Normally Closed**.
Contact 2 Function	Similar to Contact 1 Function.
Contact 2 Operation	Similar to Contact 1 Operation.
Relay 1	

Field	Entry
Relay Function	Select **Off**, **Alarm**, **Alarm & Diag**, **Diagnostics**, **Flow Direction**, or **Test Mode**.
Relay Alarm	If **Relay Function** is not **Off**, select **High Rate**, **Low Rate**, **High Forward Total 1**, **High Forward Total 2**, **Empty Pipe**, or **Any Alarm**.
Relay Operation	If **Relay Function** is not **Off**, select **Normally Open** or **Normally Closed**.
Suppress Relay	If **Relay Function** is not **Off**, select **Yes** to suppress reactivation of an alarm or **No** for no suppression.
Relay 2 (Similar to Relay 1)	

Options Tab Screen

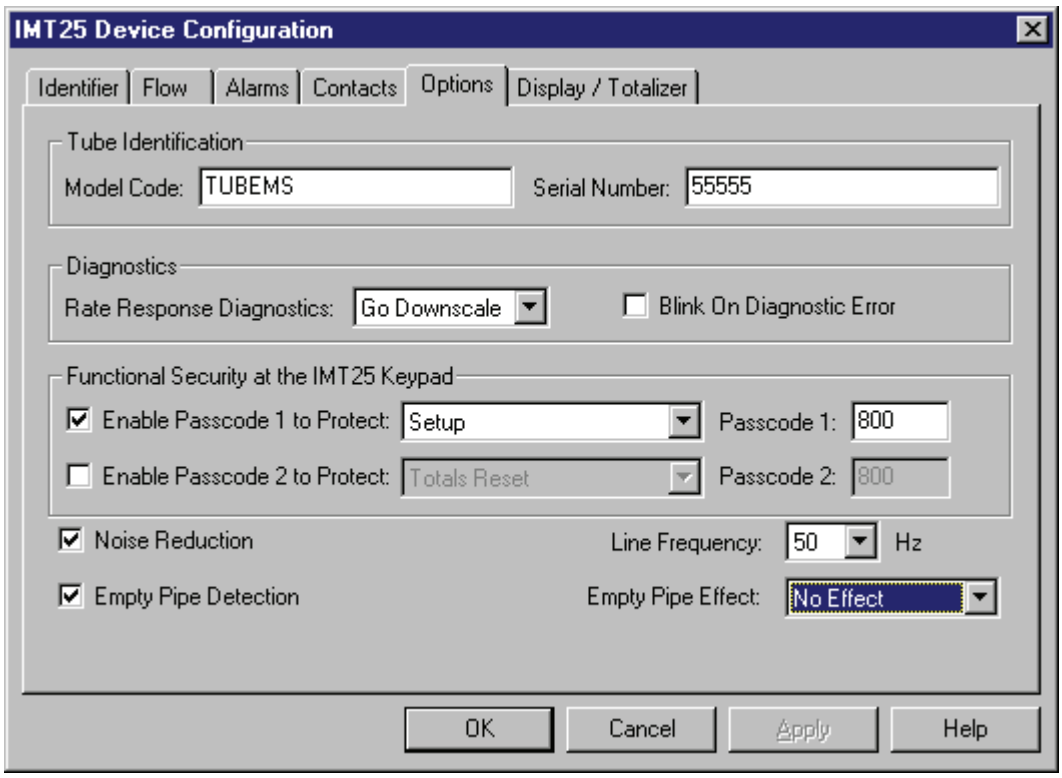


Figure E-9. Sample IMT25 Options Tab Screen

Field	Entry
Tube Identification	
Model Code	Enter model code of flowtube.
Serial Number	Enter serial number of flowtube.
Diagnostics	

Field	Entry
Rate Response Diagnostics	Select **Go Downscale** or **Go Upscale**.
Blink On Diagnostic Error	√ = Blink; Blank = Don't Blink.
Functional Security at the IMT25 Keypad (not applicable to HART device)	
Enable Passcode 1	√ = Enable; Blank = Disable. If enabled, select **Setup**, **Totals Reset**, **Setup & Totals**, **Test Mode**, **Test Mode & Setup**, **Test Mode and Totals**, or **Test Mode, Setup & Totals**. Then enter 4 digit passcode.
Enable Passcode 2	Similar to Enable Passcode 1.
Noise Reduction	√ = On; Blank = Off.
Empty Pipe Detection	√ = On; Blank = Off.
Line Frequency	Select **50 Hz** or **60 Hz**.
Empty Pipe Effect	Select **No Effect** or **Auto Signal Lock**.

Display/Totalizer Tab Screen

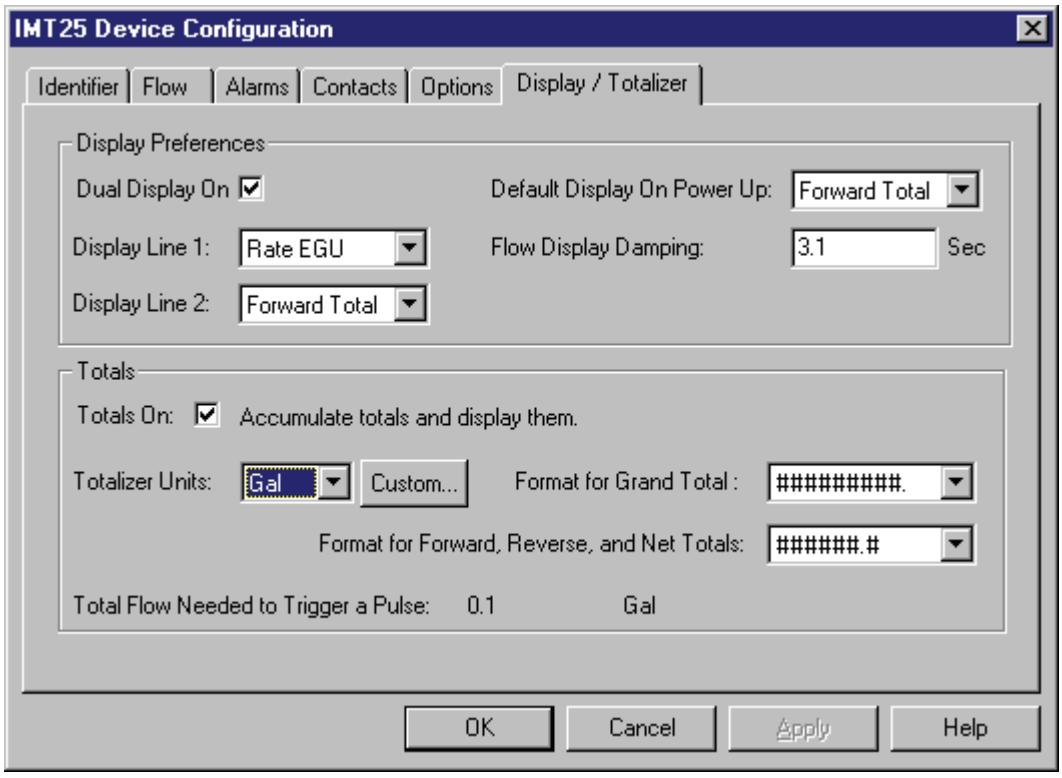


Figure E-10. Sample IMT25 Display/Totalizer Tab Screen

Field	Entry
Display Preferences	
Dual Display On	√ = On; Blank = Off.

Field	Entry
Display Line 1	If **Dual Display On** is checked (√), select from menu of six choices.
Display Line 2	If **Dual Display On** is checked (√), select from menu of six choices.
Default Display	Select from menu of seven choices.
Flow Display Damping	Enter damping response time for local display between 0.00 and 99.9 seconds.
Totals	
Total On	√ = On; Blank = Off.
Totalizer Units	If **Totalizer On** is checked (√), select **Gal**, **Lit**, or **Custom**.
Format for Grand Total	If **Totalizer On** is checked (√), select from menu of eight choices.
Format for Forward, Reverse, and Net Totals	If **Totalizer On** is checked (√), select from menu of eight choices.

Database Report

— NOTE

If a parameter in the report is "UNUSED," the corresponding value shown has no meaning for that device.

Table 25. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	29	Tot 1 Alarm Set Poin	3.161953e+007
Tag Number	ft102	Tot 2 Alarm On	00
Tag Name	IMT25	Tot 2 Alarm Set Poin	4.215937e+007
Device Name	DevNam	Empty Pipe Detect Al	00
Geo Location	lab	Rate Response Alarm	02
Date of Manufacture	10/1/97	Display Response Ala	00
Transmitter MS Code	IMT25-XMTRMSCODE	Alarm Clear	01
Transmitter Serial N	XMTRSERNUM012345	Rate Response Diag	00
Tube MS Code 1	TUBEMS	Display Response Dia	00
Tube MS Code 2	Contact In 2 Operati	Tube Serial Number	55555
Write Protect	00	Passcode 1 On	00
Default Display	02	Pass 1 Protect	00
Dual Display On/Off	00	Passcode 1	8195
Dual Display Line 1	00	Passcode 2 On	00
Dual Display Line 2	00	Pass 2 Protect	01
Rate EGU M1	00	Passcode 2	8195
Flow Rate Units M1	GPM	Line Frequency	32
EGU Rate Factor	1	Flow Direction	00
Raw Rate Format	04	Contact In 1 Functio	00

Table 25. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Rate Damping	3.1	Contact In 1 Operati	01
Totalizer On/Off	01	Contact In 2 Functio	00
Rate EGU M2	00	Contact In 2 Operati	01
Total Rate Units M2	Gal	Noise Reduction On	01
EGU Totals Slope	1	Empty Pipe Detection	01
Tot/Net Format	05	TON Count (20 mA)	29096
Grand Total Format	04	TON Count (4 mA)	4800
Output Mode	01	Meter Factor Use	1
Digital Mode	00	Cal Date	10/1/97
Analog Mode	00	Cal Name	DoneBy
Upper Range Limit #1	20000	mA Hold Value	0
Upper Range Limit #2	50	Pulse Hold	0
Upper Range Limit #3	5	Kernal Major Revisio	00
Pulse Output Mode	01	Kernal Minor Revisio	06
Pulse Out URV	100	SREVMAJ	01
Rate Max Freq	01	SREVMIN	07
Tot Max Freq	00	Display Major Revisi	00
Rate Out Damp	3	Display Minor Revisi	2d
Relay 1 Function	00	Parameter Table Offs	b7 74
Relay 1 Alarm	00	Parameter Table CRC	0d e5
Relay 1 Operation	01	Parameter Table Type	00
Relay 1 Suppression	00	Parameter Table Size	00 e4
Relay 2 Function	00	Reserved	00 00 00
Relay 2 Alarm	01		
Relay 2 Operation	01	REV_INFO	c0
Relay 2 Suppression	00	UNUSED	1/10/35
Alarms On	01	Sensor Minor Revisio	02
High Alarm On	00	Sensor Major Revisio	02
High Alarm Set Point	200	UNUSED	65002
High Alarm Deadband	10	UNUSED	65002
Low Alarm On	00	UNUSED	ea
Low Alarm Set Point	5	Low Cost Option	00 00
Low Alarm Deadband O	1	Empty Pipe Effect	00
Tot 1 Alarm On	00		

Appendix F. CFT10 Mass Flowmeters

This appendix provides information that is exclusive to the CFT10 Mass Flowmeters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

Device Data Screen

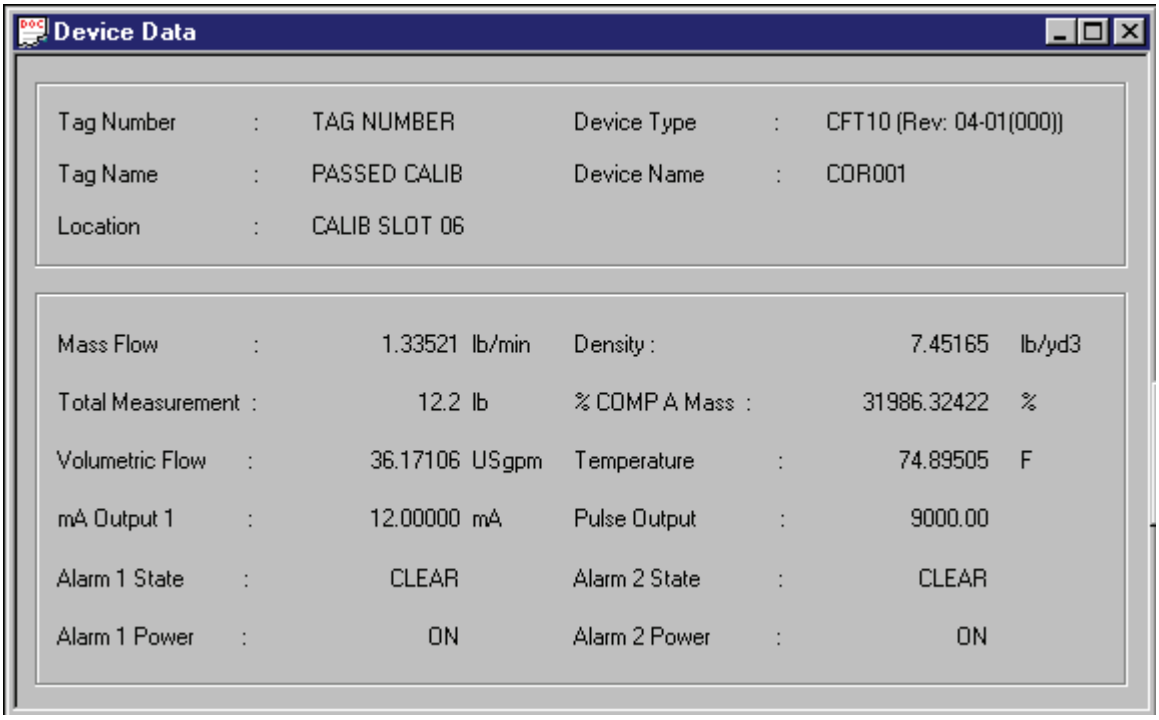

Device Data
Tag Number : TAG NUMBER
Device Type : CFT10 (Rev: 04-01(000))
Tag Name : PASSED CALIB
Device Name : COR001
Location : CALIB SLOT 06
Mass Flow : 1.33521 lb/min
Density : 7.45165 lb/yd3
Total Measurement : 12.2 lb
% COMP A Mass : 31986.32422 %
Volumetric Flow : 36.17106 USgpm
Temperature : 74.89505 F
mA Output 1 : 12.00000 mA
Pulse Output : 9000.00
Alarm 1 State : CLEAR
Alarm 2 State : CLEAR
Alarm 1 Power : ON
Alarm 2 Power : ON

Figure F-1. Sample CFT10 Device Data Screen

Error Messages

Status Error Messages

Table 26. Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Set if EEPROM write is in progress and pending.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Initializing	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Tube Imbalance	The tube is partially filled and cannot run.	Check flowmeter and process conditions. Cycle power to transmitter.
Tube Failure	There is a tube failure.	Check flowmeter and process conditions.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Flow Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.
Density Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.
Temperature Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.

Diagnostic Error Messages

Table 27. Diagnostic Error Messages

Code	Error Message	Recommended Action
02	ROM Checksum Error	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
03	EEPROM Chksum	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
13	EEPROM Write Error	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
1F4	Analog Supply Low	Analog power supply voltage is low. Contact the CSC.
1F5	Analog Supply High	Analog power supply voltage is high. Contact the CSC.
1F6	Drive Supply Low	Drive power supply voltage is low. Contact the CSC.
1F7	Drive Supply High	Drive power supply voltage is high. Contact the CSC.
258	Proc Brd Temp Low	The processor PWA temperature is too low. Measurements are invalid. Relocate the transmitter or adjust the temperature.
259	Proc Brd Temp High	The processor PWA temperature is too high. Measurements are invalid. Relocate the transmitter or adjust the temperature.
25A	Cur Brd Temp Low	The current PWA temperature is too low. Measurements are invalid. Relocate the transmitter or adjust the temperature.
25B	Cur Brd Temp High	The current PWA temperature is too high. Measurements are invalid. Relocate the transmitter or adjust the temperature.
2BC	Sensor Stalled	Signal received from flowtube sensors is below minimum required level. Measurement invalid. Contact the CSC.
2BD	Tube Imbalance	An imbalance has been detected between sensors in the flowtube. Transmitter switches off-line. All measurement stops. Contact the CSC.
320	RTD Meas Below Min	Resistance for temperature measurement is below minimum required. Measurements invalid. Contact the CSC.
321	RTD Meas Above Max	Resistance for temperature measurement is above maximum allowed. Measurements invalid. Contact the CSC.

Table 27. Diagnostic Error Messages (Continued)

Code	Error Message	Recommended Action
322	Osc. Freq High	Flowtube driving oscillator frequency is above the maximum allowed. Measurements invalid. Contact the CSC.
323	Osc. Freq Low	Flowtube driving oscillator frequency is below the minimum required. Measurements invalid. Contact the CSC.
324	Phase Diff High	Excessive signal phase difference between sensors. Flow measurement and total invalid. Confirm that mass flow rate does not exceed maximum mass flow rate of flowtube. Contact the CSC.
384	Process Temp Low	Process temperature below lower flowmeter limit. Adjust process temperature.
385	Process Temp High	Process temperature exceeds upper flowmeter limit. Adjust process temperature.
386	Process Dens Low	Process density below lower flowmeter limit. Adjust process density.
387	Process Dens High	Process density exceeds upper flowmeter limit. Adjust process density.
388	Flow Over Rev Lim	Flow exceeds calibration limit in the reverse direction. Adjust process or calibration limit, as required.
389	Flow Over Fwd Lim	Flow exceeds calibration limit in the forward direction. Adjust process or calibration limit, as required.

Calibration

You can perform the following calibration procedures on an CFT10 Mass Flowmeter using the Intelligent Field Device Configurators:

- ReZero transmitter
- mA Calibration
- Restore Factory mA Calibration
- Startup Zero
- Zero Total.

ReZero Transmitter

This function permits you to reset the zero point for the transmitter. To set the zero on initial installation of your transmitter, see “Startup Zero” on page 151. The procedure to perform the ReZero function follows:

1. Select **ReZero** from the **Calibration** menu or the ReZero icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Set the transmitter flow to zero and select **Continue**.

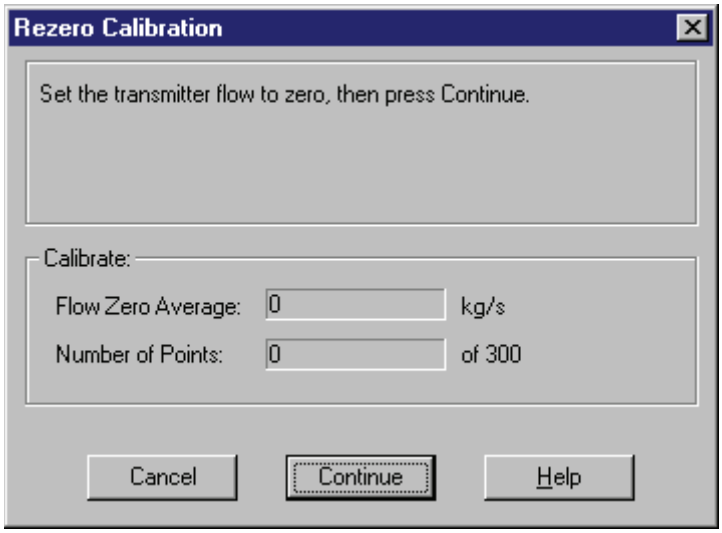


Figure F-2. Sample CFT10 ReZero Calibration Screen

4. Wait while the device is calibrating. When this has occurred, the new flow zero offset is shown. Save this calibration to the device by selecting **Continue**.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Startup Zero

This function is used to set the zero only on initial installation of the transmitter. After the initial installation is complete, use "This function permits you to reset the zero point for the transmitter. To set the zero on initial installation of your transmitter, see "Startup Zero" on page 151. The procedure to perform the ReZero function follows:" on page 150 to reset the zero. The procedure to set the zero on initial installation of your transmitter is as follows:

1. Select **Startup Zero** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Set the transmitter flow to zero and select **Continue**. The Startup Zero screen is similar to the ReZero Calibration screen shown in Figure F-2.
4. Wait for the first of three phases of the Startup Zero calibration to occur. When the first phase has been completed, select **Continue** to resume the procedure.
5. Wait for the second phase of the Startup Zero calibration to occur. When the second phase has been completed, select **Continue** to resume the procedure.
6. Wait for the third phase of the Startup Zero calibration to occur. When the third phase has been completed, the zero flow offset value is shown. Save this calibration to the transmitter by selecting **Continue**.
7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Zero Total

This function sets the transmitter total measurement to zero. The procedure to do this is as follows:

1. Select **Zero Total** from the **Calibration** menu or the Zero Total icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **Continue** again to reset the transmitter total measurement to zero.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory mA

This function restores the factory mA calibration to the transmitter. The procedure to perform this function is as follows:

1. Select **mA Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **Restore Factory 4-20 mA Settings** from the mA Calibration screen (see Figure F-3) and then select **Continue**. The factory calibration is restored.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

— NOTE

From the mA Calibration screen you can also restore the factory 4 to 20 mA settings. This does not require insertion of a meter in the loop wiring.

The procedure to perform a mA Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.
5. Set the **Step Size** from the menu (**-0.2**, **-0.02**, **-0.002**, **0.002**, **0.02**, **0.2**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.

8. Repeat Steps 4 and 5.
9. Select **Continue** to save the calibration to the device.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

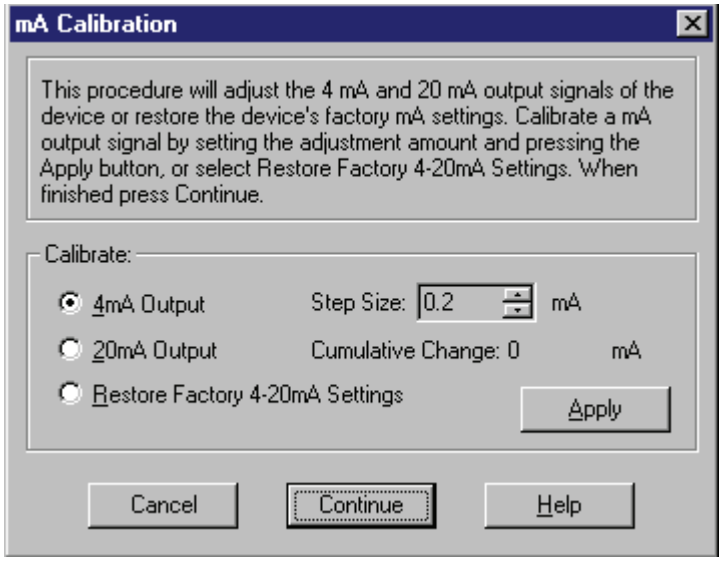

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device or restore the device's factory mA settings. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button, or select Restore Factory 4-20mA Settings. When finished press Continue.
Calibrate:
4mA Output
Step Size: 0.2
mA
20mA Output
Cumulative Change: 0
mA
Restore Factory 4-20mA Settings
Apply
Cancel
Continue
Help

Figure F-3. Sample CFT10 mA Calibration Screen

Configuration

Identifier Tab Screen

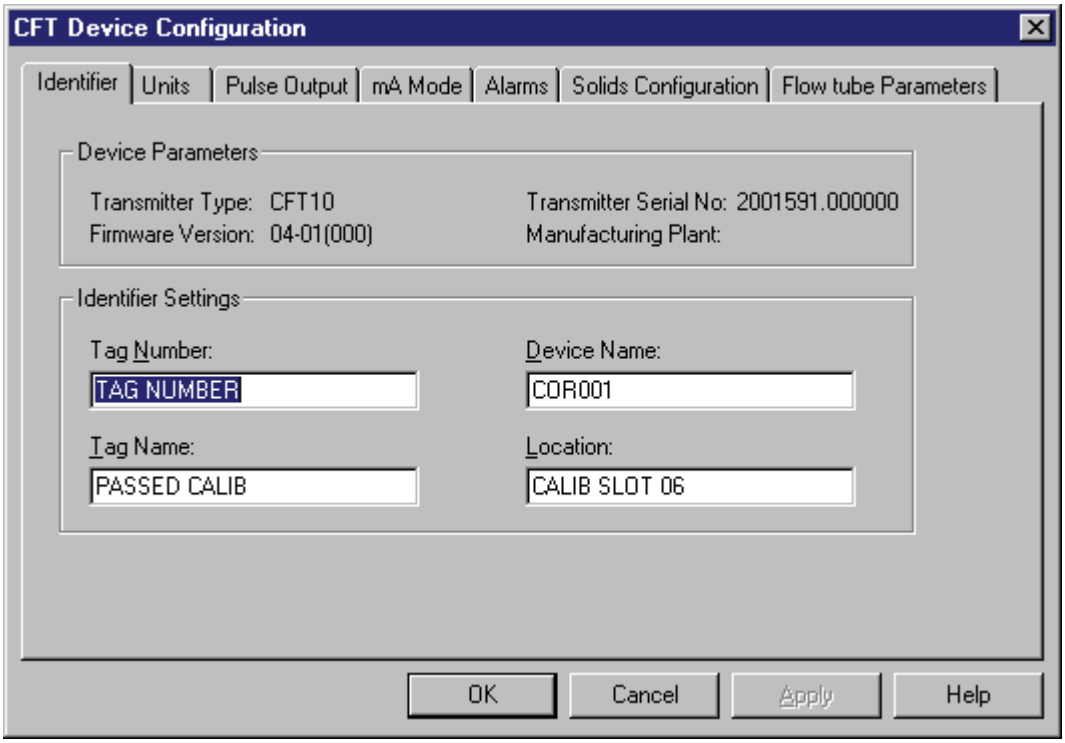


Figure F-4. Sample CFT10 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Units Tab Screen

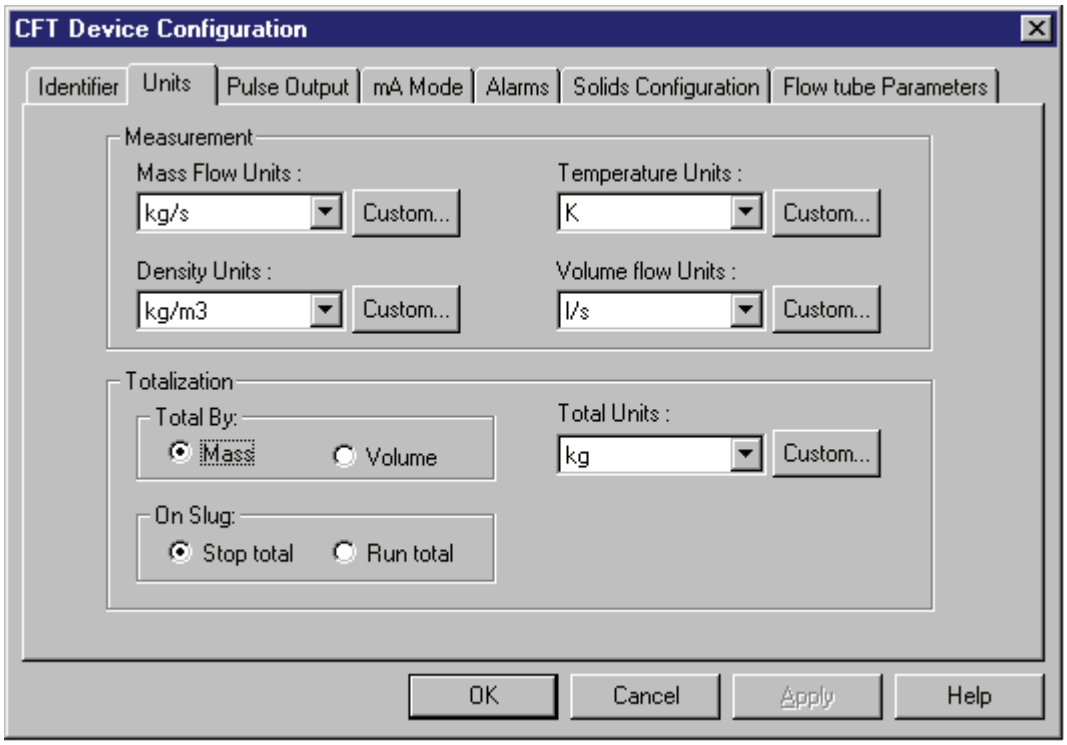


Figure F-5. Sample CFT10 Units Tab Screen

Field	Entry
Measurement	
Mass Flow Units	Select from menu of choices or select **Custom**.
Density Units	Select from menu of choices or select **Custom**.
Temperature Units	Select **R**, **F**, **C**, **K**, or **Custom**.
Volume Flow Units	Select from menu of choices or select **Custom**.
Totalization	
Total By	Select **Mass** or **Volume**.
Total Units	Select from menu of choices or select Custom.
On Slug	Select **Run Total** or **Stop Total**.
Total	Select from menu of choices.

Pulse Output Tab Screen

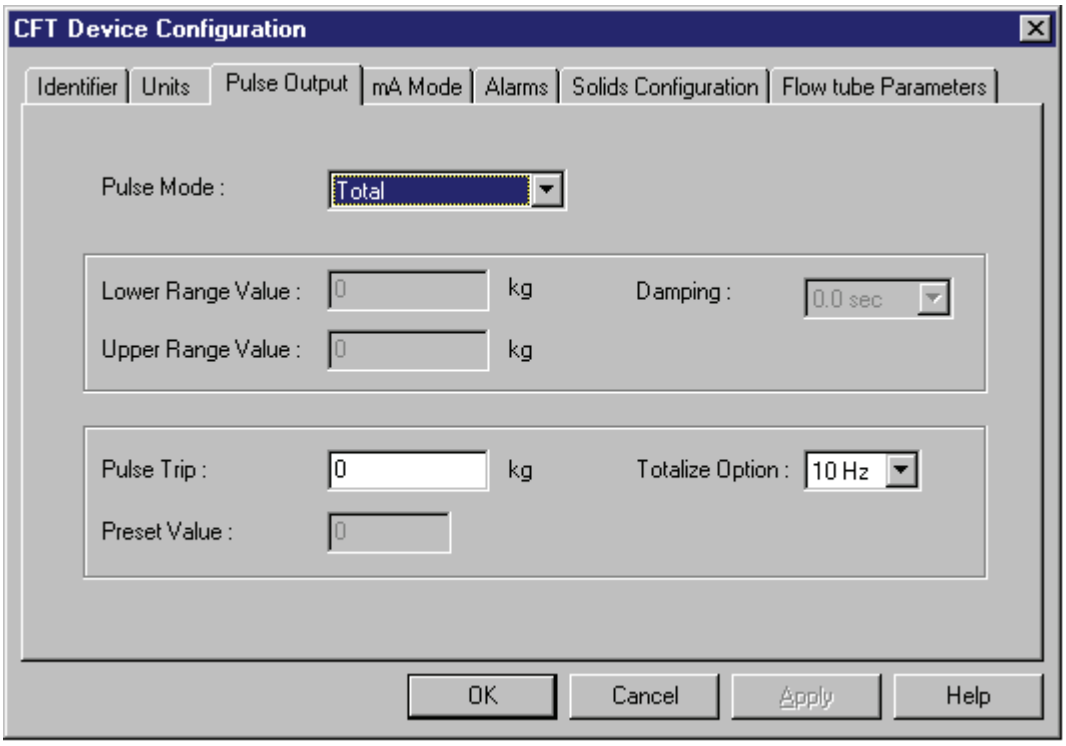


Figure F-6. Sample CFT10 Pulse Output Tab Screen

Field	Entry
Pulse Mode	Select **Mass Flow**, **Density**, **Temperature**, **Total, Vol. Flow**, **% Solids**, **Preset**, or **Off**.
Lower Range Value	Enter value if Pulse mode is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Upper Range Value	Enter value if Pulse mode is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Damping	Select one of eight choices from **No Damping** to **16** seconds.
Pulse Trip	Enter value if Pulse mode is Total.
Preset Value	Enter value if Pulse mode is Preset.
Totalize Option	Select **5 Hz**, **10 Hz**, **15 Hz** or **Off**.

mA Mode Tab Screen

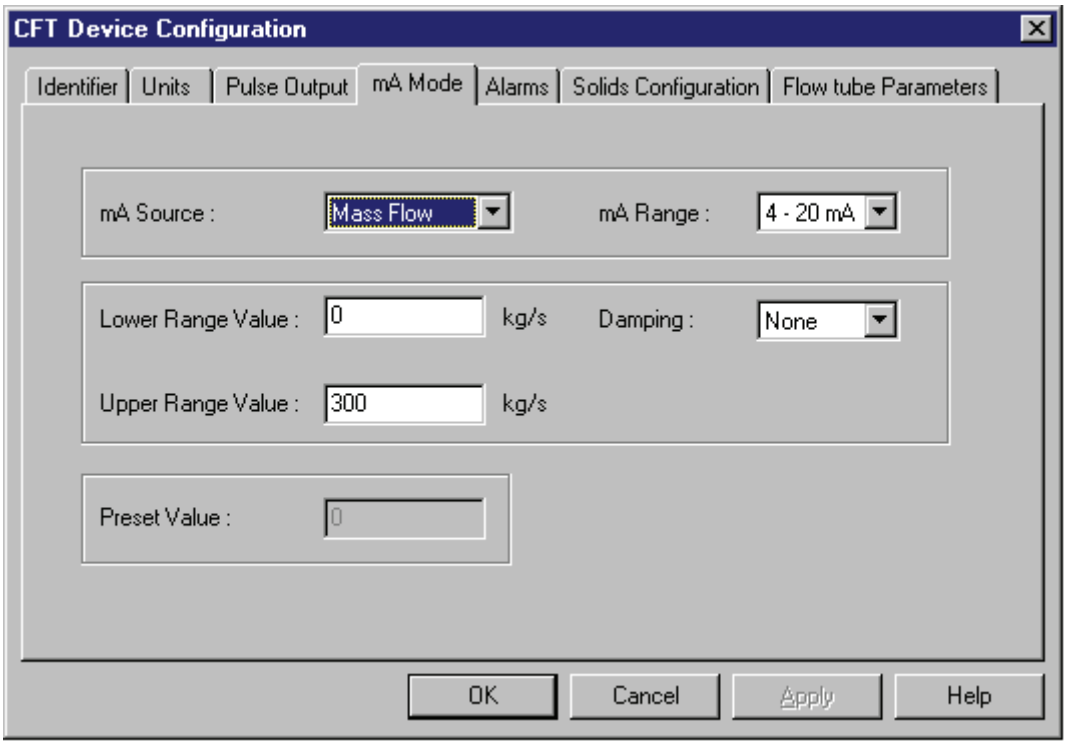


Figure F-7. Sample CFT10 mA Mode Tab Screen

Field	Entry
mA Source	If Pulse Current is 4-20 mA, select **Mass Flow**, **Density**, **Temperature**, **Vol. Flow**, **% Solids**, **Preset**, or **Off**. If Pulse Current is 0-20 mA, select **Density**, **Temperature**, **Vol. Flow**, or **% Solids**.
mA Range	Select **4-20 mA** or **0-20 mA**.
Lower Range Value	Enter value if mA Source is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Upper Range Value	Enter value if mA Source is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Damping	If mA Source is Mass Flow, Density, Temperature, Vol. Flow, or % Solids, select one of eight choices from **No Damping** to **16** seconds.
Preset Value	Enter value if mA Source is Preset.

Alarms Tab Screen

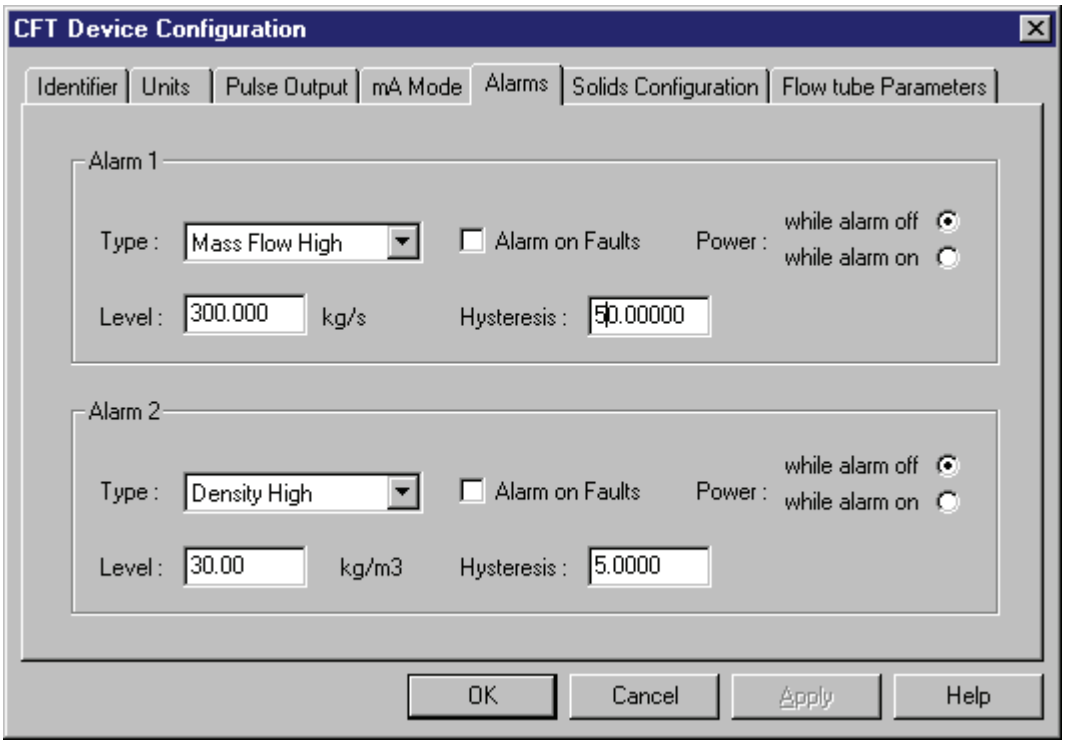


Figure F-8. Sample CFT10 Alarms Tab Screen

Field	Entry
Alarm 1	
Type	Select **Preset Off**, **Preset On**, **Mass Flow High**, **Mass Flow Low**, **Density High**, **Density Low**, **Temp High**, **Temp Low**, **Volume Flow High**, **Volume Flow Low**,**% Solids High**, **% Solids Low**, **Pulse Overrun**, or **Fault Only**.
Alarm on Faults	√ = Enable; Blank = Disable.
Power	Select to power alarm contact on alarm or when no alarm exists.
Level	Enter value if Alarm Type is Mass Flow High, Mass Flow Low, Density High, Density Low, Temp High, Temp Low, Volume Flow High, Volume Flow Low, % Solids High, or % Solids Low.
Hysteresis	Enter value if Alarm Type is Mass Flow High, Mass Flow Low, Density High, Density Low, Temp High, Temp Low, Volume Flow High, Volume Flow Low, % Solids High, or % Solids Low.
Alarm 2 (Similar to Alarm 1)	

Solids Configuration Tab Screen

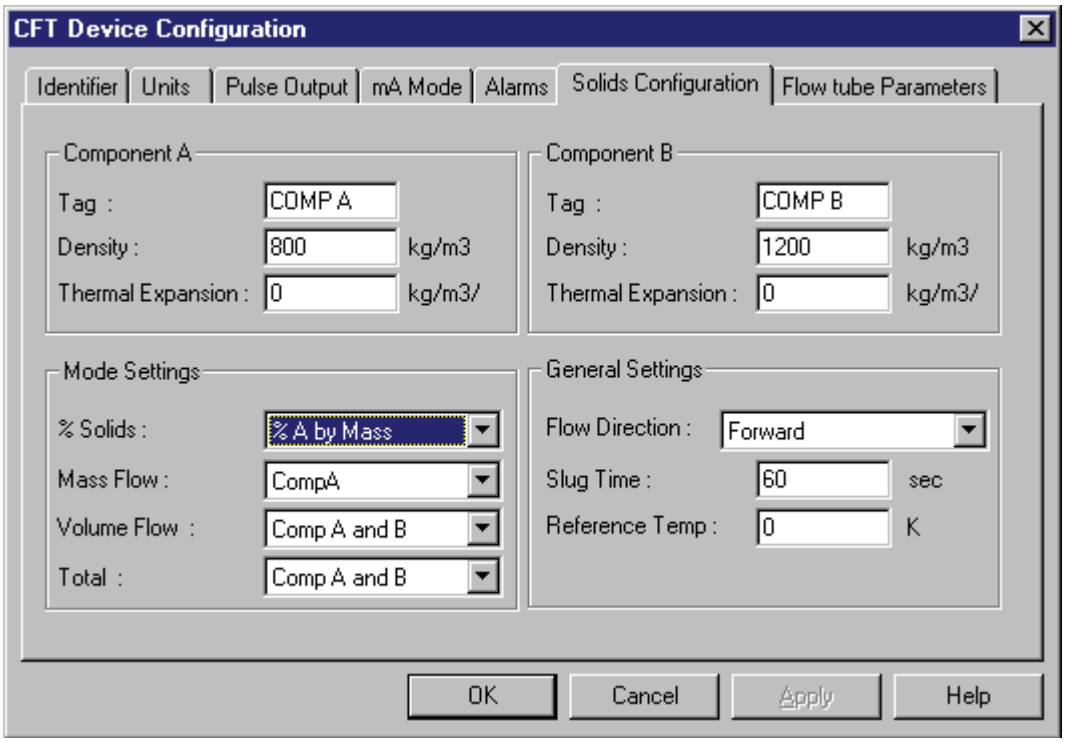


Figure F-9. Sample CFT10 Solids Configuration Tab Screen

Field	Entry
Component A	
Tag	Enter maximum of six characters. Not configurable using IFDC.
Density	Enter value.
Thermal Expansion	Enter value.
Component B (Similar to Component A)	
Mode Settings	
% Solids	Select **% A by Mass**, **% B by Mass**, **% A by Vol**, or **% B by Vol**.
Mass Flow	Select **Comp A**, **Comp B**, or **Comp A + B**.
Volume Flow	Select **Comp A**, **Comp B**, or **Comp A + B**.
Total	Select **Comp A**, **Comp B**, or **Comp A + B**.
General Settings	
Flow Direction	Select **Forward**, **Positive Bi-directional**, **Negative Bi-directional**, or **Reverse**.
Slug Time	Enter allowable time for flow slug to exist before alarm is triggered. Specify in multiples of 10 seconds from 10 to 2550 seconds.
Reference Temp	Enter value.

Flowtube Parameters Tab Screen

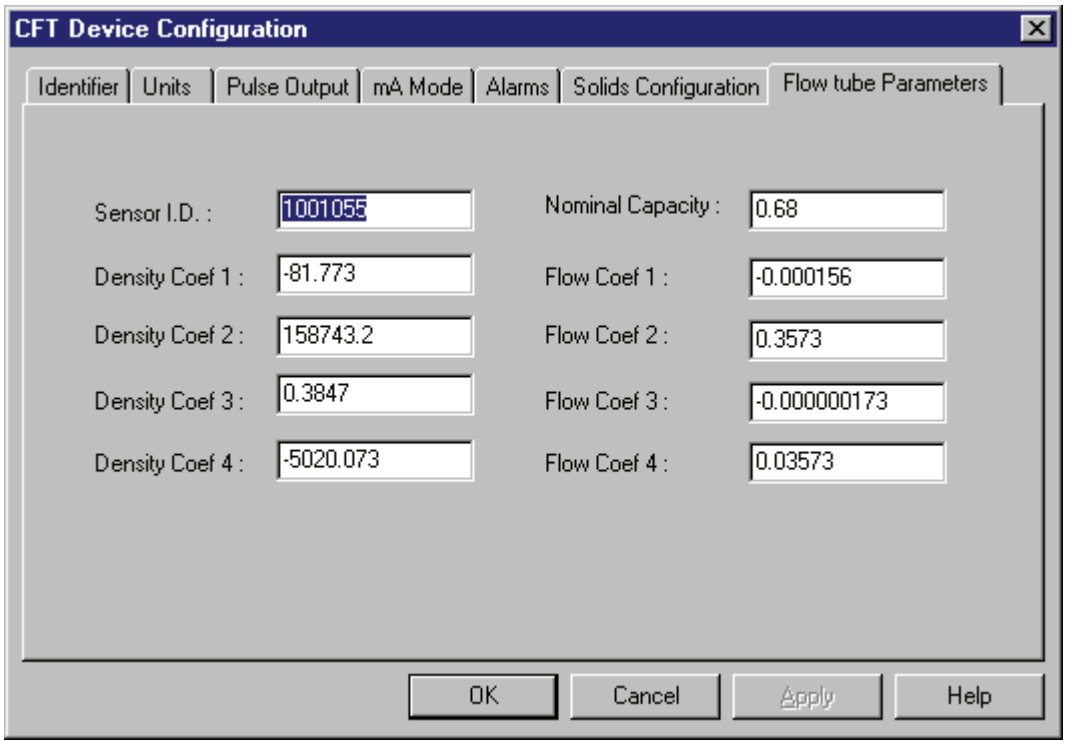


Figure F-10. Sample CFT10 Flowtube Parameters Tab Screen

Field	Entry
Sensor I.D.	Enter data from flowtube data plate.
Density Coef 1	
Density Coef 2	
Density Coef 3	
Density Coef 4	
Nominal Capacity	
Flow Coef 1	
Flow Coef 2	
Flow Coef 3	
Flow Coef 4	

Database Report

Table 28. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type	20	Neg Phase Cal 3	0
Tag Number	TEST TAG NUM	Neg Phase Cal 4	0
Tag Name	CORIOLIS METER	RTD Res to Temp 1	0
Device Name	COR001	RTD Res to Temp 2	40
Geo Location	DEFAULT LOCAT.	RTD Res to Temp 3	0
Mass Flow Units	kg/s	RTD Res to Temp 4	0
Density Units	kg/m3	l/Pulse Width 1	0
Temperature Units	K	l/Pulse Width 2	1
Total Units	kg	l/Pulse Width 3	0
Vol Flow Units	l/s	l/Pulse Width 4	0
Comp A Label	COMP A	Clock Calibration	5e-007
Comp B Label	COMP B	Xmtr Serial Num	1
Slug Flow (/10)	06	Xmtr Manuf Plant	1a
Pulse Out Slope	1	Cur Slope Trim	1
Pulse Out Offset	0	Cur Offset Trim	0
Current Out Slope	1	Dbase Chng Count	ff
Current Out Offset	0	Rollover Total	10000
Mass Flow Slope	1	Init Required	00
Density Slope	1	Processor Brd Temp	89
Temperature Slope	1	Current Brd Temp	88
Total Slope	1	RTD Ohms	83.31393
Vol Flow Slope	1000	Device Type	20
Mass Flow Offset	0	Xmtr Serial No	1
Density Offset	0	Plant Code	1a
Temperature Offset	0	Major Rev Number	30 34
Total Offset	0	Minor Rev Number	30 30
Vol Flow Offset	0	Firmware Update No	30 30 30
Density Comp A	800	Diagnostic Error	00 00
Density Comp B	1200	Totalize Option	02
Density Ref Temp	0		
Thermal Exp A	02		
Thermal Exp B	0		
Pulse Out Control	0e		
Current Out Control	07		
Alarm 1 Control	02		
Alarm 2 Control	04		
Gen Func Cntrl 1	00		
Gen Func Cntrl 2	00		
Pulse Out Preset	0.5		
Current Out Preset	0.5		
Alarm 1 Level	300		
Alarm 2 Level	30		
Alarm 1 Hysteresis	50		

Table 28. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Alarm 2 Hysteresis	5		
Flow Zero Offset	0		
Tube Serial No.	1		
Dens Coef 1	0		
Dens Coef 2	10000		
Dens Coef 3	0		
Dens Coef 4	0		
Nominal Capacity	1000		
Flow Coef 1	0		
Flow Coef 2	1		
Flow Coef 3	0		
Flow Coef 4	1		
Dens Coef 5	0		
Dens Coef 6	0		
Temp Cor Slope	1		
Temp Cor Offset	0		
Phase In Cal 1	0		
Phase In Cal 2	1		
Phase In Cal 3	0		
Phase In Cal 4	0		
Neg Phase Cal 1	0		
Neg Phase Cal 2	1		

Appendix G. CFT15 Mass Flowmeters

This appendix provides information that is exclusive to the CFT15 Mass Flowmeters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

NOTE

The CFT15 transmitter is a Modbus device which is not supported by IFDC running on I/A Series stations. The PC20 **does** support configuration and calibration of the CFT15.

Device Data Screen

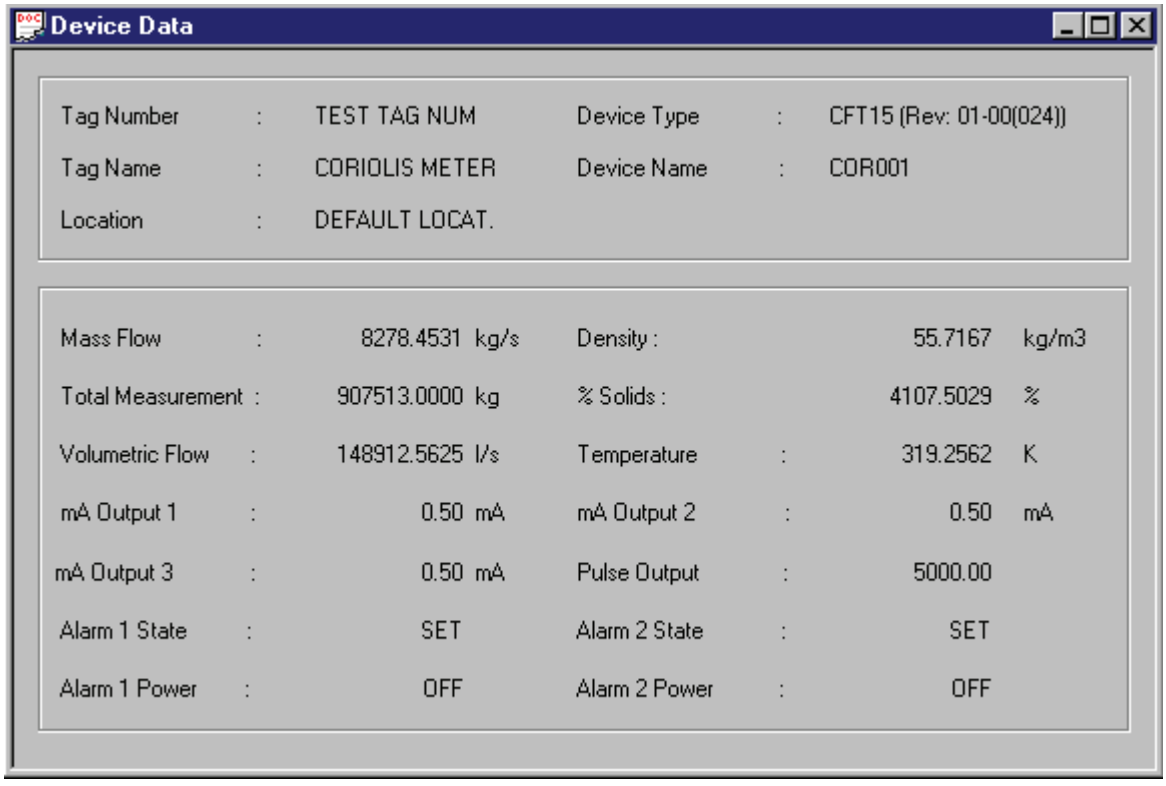

Device Data
Tag Number : TEST TAG NUM
Device Type : CFT15 (Rev: 01-00(024))
Tag Name : CORIOLIS METER
Device Name : COR001
Location : DEFAULT LOCAT.
Mass Flow : 8278.4531 kg/s
Density : 55.7167 kg/m3
Total Measurement : 907513.0000 kg
% Solids : 4107.5029 %
Volumetric Flow : 148912.5625 l/s
Temperature : 319.2562 K
mA Output 1 : 0.50 mA
mA Output 2 : 0.50 mA
mA Output 3 : 0.50 mA
Pulse Output : 5000.00
Alarm 1 State : SET
Alarm 2 State : SET
Alarm 1 Power : OFF
Alarm 2 Power : OFF

Figure G-1. Sample CFT15 Device Data Screen

Error Messages

Status Error Messages

Table 29. Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
DeviceBusy	Set if EEPROM write is in progress and pending.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Initializing	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Tube Imbalance	The tube is partially filled and cannot run.	Check flowmeter and process conditions. Cycle power to transmitter.
Tube Failure	There is a tube failure.	Check flowmeter and process conditions.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Flow Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.
Density Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.
Temperature Alarm	Indicates presence of a flowmeter alarm condition.	Check flowmeter and process conditions.

Diagnostic Error Messages

Table 30. Diagnostic Error Messages

Code	Error Message	Recommended Action
02	IOP ROM Checksum Error	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
03	IOP EEPROM Chksum	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
06	EOP ROM Chksum	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
07	EOP EEPROM Chksum	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
13	IOP EEPROM Write Error	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
14	EOP EEPROM Write	Press **0** on transmitter integral keypad/display (if so equipped) while viewing fault from **Device Status** menu to attempt to clear message. If message persists, contact the CSC.
1F4	Analog Supply Low	Analog power supply voltage is low. Contact the CSC.
1F5	Analog Supply High	Analog power supply voltage is high. Contact the CSC.
1F6	Drive Supply Low	Drive power supply voltage is low. Contact the CSC.
1F7	Drive Supply High	Drive power supply voltage is high. Contact the CSC.
258	Proc Brd Temp Low	The processor PWA temperature is too low. Measurements are invalid. Relocate the transmitter or adjust the temperature.
259	Proc Brd Temp High	The processor PWA temperature is too high. Measurements are invalid. Relocate the transmitter or adjust the temperature.
25A	Cur Brd Temp Low	The current PWA temperature is too low. Measurements are invalid. Relocate the transmitter or adjust the temperature.

Table 30. Diagnostic Error Messages (Continued)

Code	Error Message	Recommended Action
25B	Cur Brd Temp High	The current PWA temperature is too high. Measurements are invalid. Relocate the transmitter or adjust the temperature.
2BC	Sensor Stalled	Signal received from flowtube sensors is below minimum required level. Measurement invalid. Contact the CSC.
2BD	Tube Imbalance	An imbalance has been detected between sensors in the flowtube. Transmitter switches off-line. All measurement stops. Contact the CSC.
2BE	IPL Comms Failure	Contact the CSC.
320	RTD Meas Below Min	Resistance for temperature measurement is below minimum required. Measurements invalid. Contact the CSC.
321	RTD Meas Above Max	Resistance for temperature measurement is above maximum allowed. Measurements invalid. Contact the CSC.
322	Osc. Freq High	Flowtube driving oscillator frequency is above the maximum allowed. Measurements invalid. Contact the CSC.
323	Osc. Freq Low	Flowtube driving oscillator frequency is below the minimum required. Measurements invalid. Contact the CSC.
324	Phase Diff High	Excessive signal phase difference between sensors. Flow measurement and total invalid. Confirm that mass flow rate does not exceed maximum mass flow rate of flowtube. Contact the CSC.
384	Process Temp Low	Process temperature below lower flowmeter limit. Adjust process temperature.
385	Process Temp High	Process temperature exceeds upper flowmeter limit. Adjust process temperature.
386	Process Dens Low	Process density below lower flowmeter limit. Adjust process density.
387	Process Dens High	Process density exceeds upper flowmeter limit. Adjust process density.
388	Flow Over Rev Lim	Flow exceeds calibration limit in the reverse direction. Adjust process or calibration limit, as required.
389	Flow Over Fwd Lim	Flow exceeds calibration limit in the forward direction. Adjust process or calibration limit, as required.

Calibration

You can perform the following calibration procedures on an CFT15 Mass Flowmeter using the Intelligent Field Device Configurators:

- ReZero Transmitter
- Startup Zero
- Zero Total.

ReZero Transmitter

This function permits you to reset the zero point for the transmitter at zero flow conditions. To set the zero on initial installation of your transmitter, see “Startup Zero” on page 168.

The transmitter samples 300 flow readings during the procedure. Prior to beginning the procedure, connect the transmitter to the flowtube and fill the flowtube with the fluid to be measured. Then, flush out the flowtube for approximately five minutes to eliminate air in the system piping.

The procedure to perform the ReZero function is as follows:

1. Select **ReZero** from the **Calibration** menu or the ReZero icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Set the transmitter flow to zero and select **Continue**.
4. Wait for the new zero flow offset to be determined. When this has occurred, the new value is shown. Save this calibration to the transmitter by selecting **Continue**.

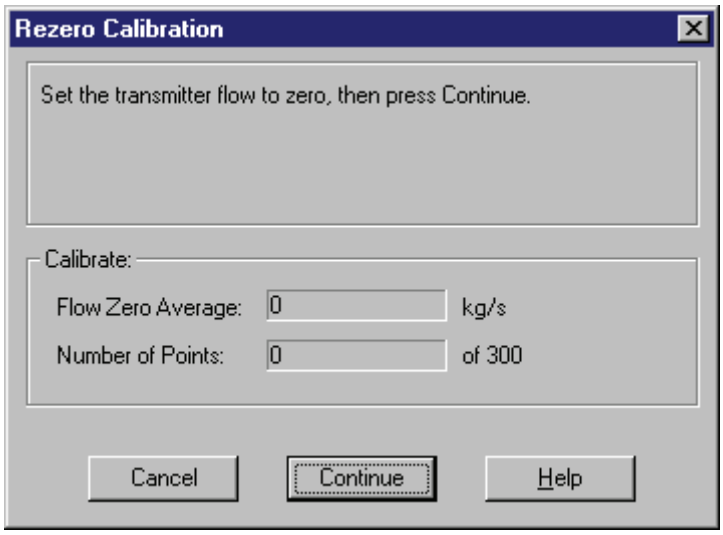


Figure G-2. Sample CFT15 ReZero Calibration Screen

5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Startup Zero

This function is used to set the zero only on initial installation of the transmitter. At other times, use “ReZero Transmitter” on page 167 to reset the zero.

The transmitter samples 300 flow readings during the procedure. Prior to beginning the procedure, connect the transmitter to the flowtube and fill the flowtube with the fluid to be measured. Then, flush out the flowtube for approximately five minutes to eliminate air in the system piping.

The procedure to perform the Startup Zero function is as follows:

1. Select **Startup Zero** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Set the transmitter flow to zero and select **Continue**. The Startup Zero screen is similar to the ReZero Calibration screen shown in Figure G-2.
4. Wait for the first phase (of three) of the Startup Zero calibration to occur. When phase 1 has been completed, select **Continue** to resume the procedure.
5. Wait for the second phase of the Startup Zero calibration to occur. When phase 2 has been completed, select **Continue** to resume the procedure.
6. Wait for the third phase of the Startup Zero calibration to occur. When phase 3 has been completed, the zero flow offset value is shown. Save this calibration to the transmitter by selecting **Continue**.
7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Zero Total

This function sets the transmitter total measurement to zero. The procedure follows:

1. Select **Zero Total** from the **Calibration** menu or the Zero Total icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **Continue** again to reset the transmitter total measurement to zero.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

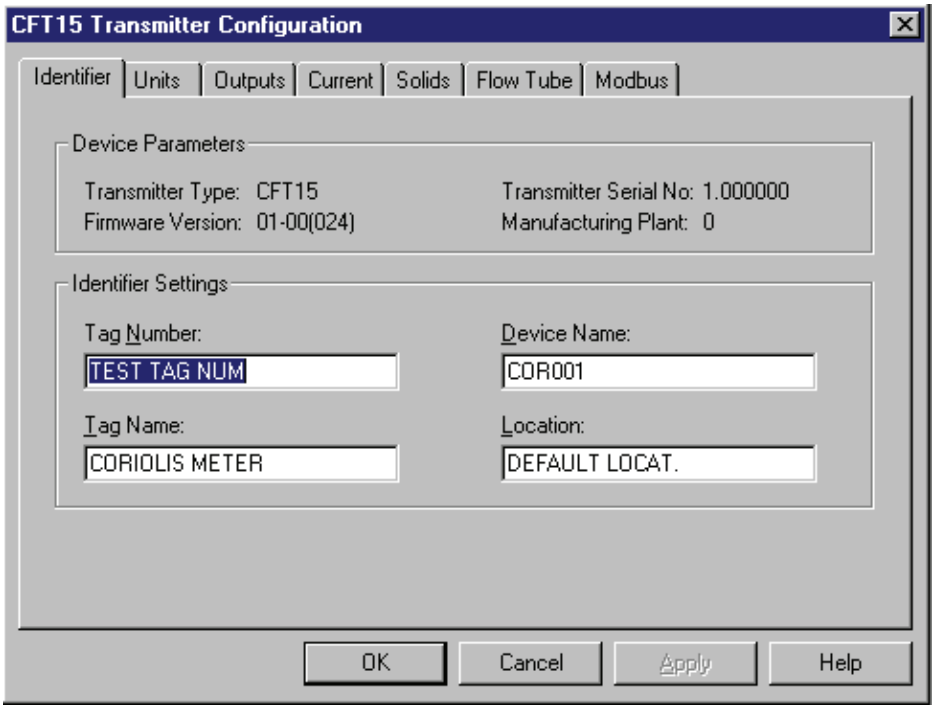


Figure G-3. Sample CFT15 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Units Tab Screen

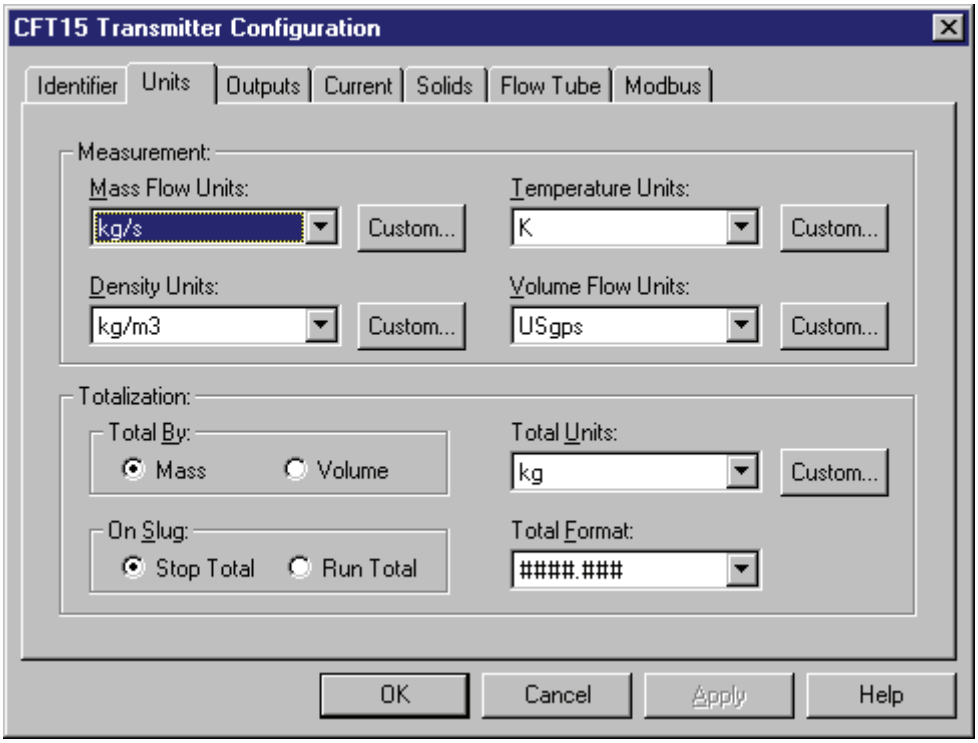


Figure G-4. Sample CFT15 Units Tab Screen

Field	Entry
Measurement	
Mass Flow Units	Select from menu of choices or select **Custom**.
Density Units	Select from menu of choices or select **Custom**.
Temperature Units	Select **R**, **F**, **C**, **K**, or **Custom**.
Volume Flow Units	Select from menu of choices or select **Custom**.
Totalization	
Total By	Select **By Mass** or **By Volume**.
Total Units	Select from menu of choices or select **Custom**.
On Slug	Select **Run Total** or **Stop Total**.
Total Format	Select from menu of choices.

Outputs Tab Screen

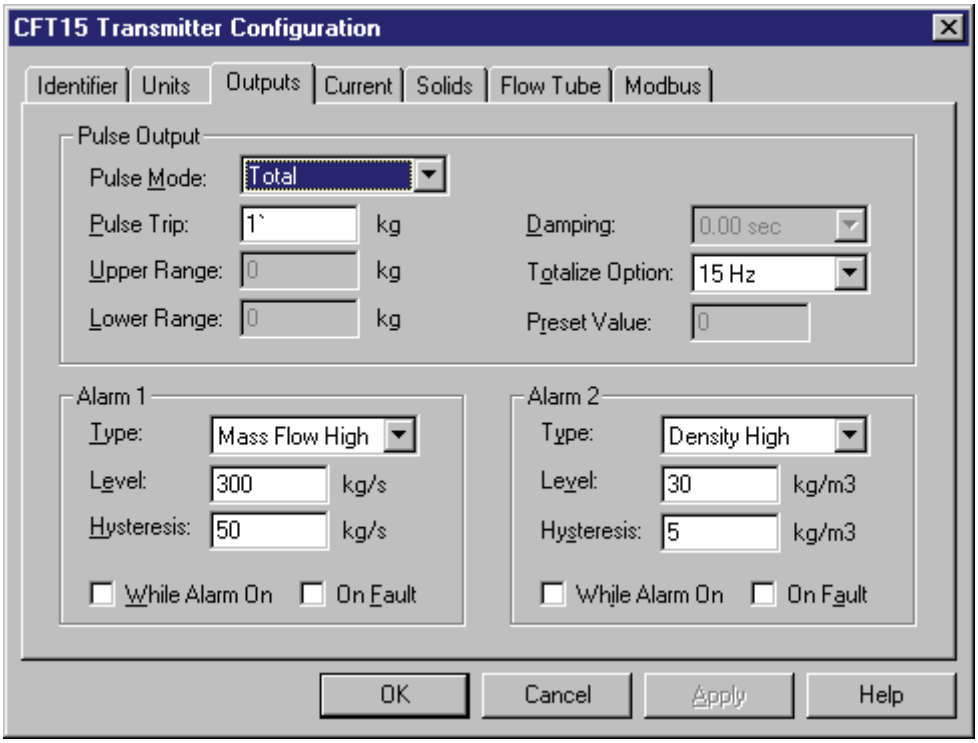


Figure G-5. Sample CFT15 Outputs Tab Screen

Field	Entry
Pulse Output	
Pulse Mode	Select **Mass Flow**, **Density**, **Temperature**, **Total**, **Volumetric Flow**, **% Solids**, **Preset**, or **Off**.
Pulse Trip	Enter value if Pulse mode is Total.
Upper Range	Enter value if Pulse mode is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Lower Range	Enter value if Pulse mode is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Damping	Select one of eight choices from **No Damping** to **16** seconds if Pulse mode is Mass Flow, Density, Temperature, Vol. Flow, or % Solids.
Totalize Option	Select **5 Hz**, **10 Hz**, **15 Hz** or **Off**.
Preset Value	Enter value if Pulse mode is Preset.
Alarm 1	
Type	Select from menu of choices.
Level	Enter value if Alarm Type is not Preset On, Preset Off, Pulse Overrun, or Fault Only.

Field	Entry
Hysteresis	Enter value if Alarm Type is not Preset On, Preset Off, Pulse Overrun, or Fault Only.
While Alarm On	√ = Activates when alarm condition exists; Blank = Does not activate when alarm condition exists.
On Fault	√ = Activates when fault condition occurs Blank = Does not activate when fault condition occurs.
Alarm 2 (Similar to Alarm 1)	

Current Tab Screen

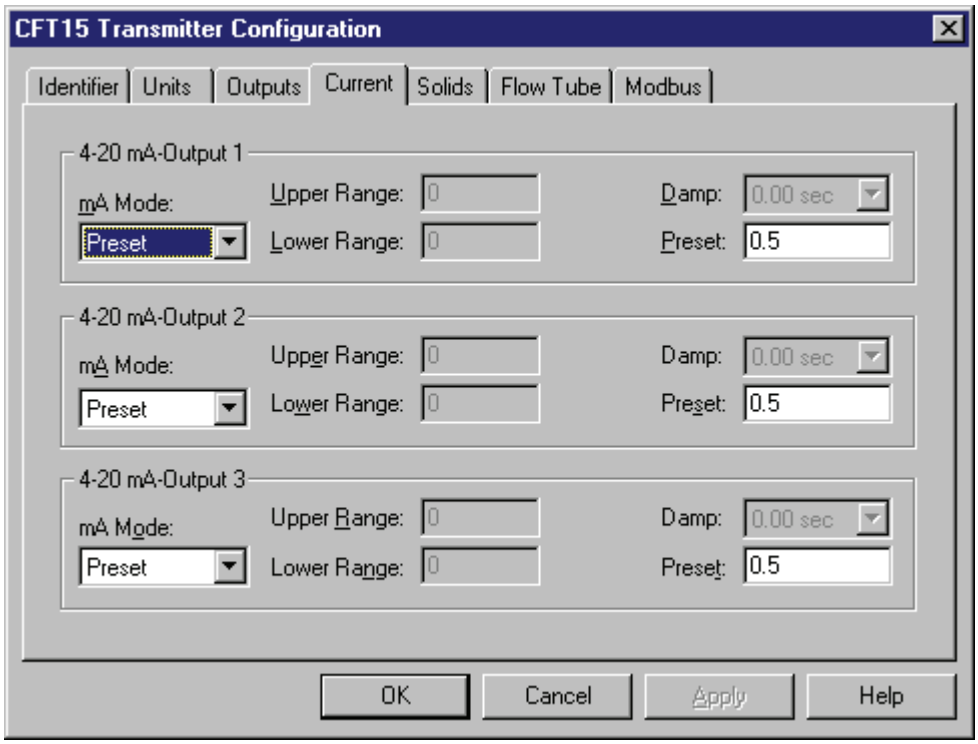


Figure G-6. Sample CFT15 Current Tab Screen

Field	Entry
4-20 mA - Output 1	
mA Mode	Select **Mass Flow**, **Density, Temperature**, **Vol. Flow**, **% Solids**, **Preset**, or **Off**.
Upper Range	Enter value if mA Mode is not **Off** or **Preset**.
Lower Range	Enter value if mA Mode is not **Off** or **Preset**.
Damp	If mA Mode is not **Off** or **Preset**, select one of eight choices from no damping to 16 seconds.
Preset	Enter value if mA Mode is **Preset**.

4-20 mA - Output 2 (Similar to 4-20 mA Output 1).
4-20 mA - Output 3 (Similar to 4-20 mA Output 1).

Solids Tab Screen

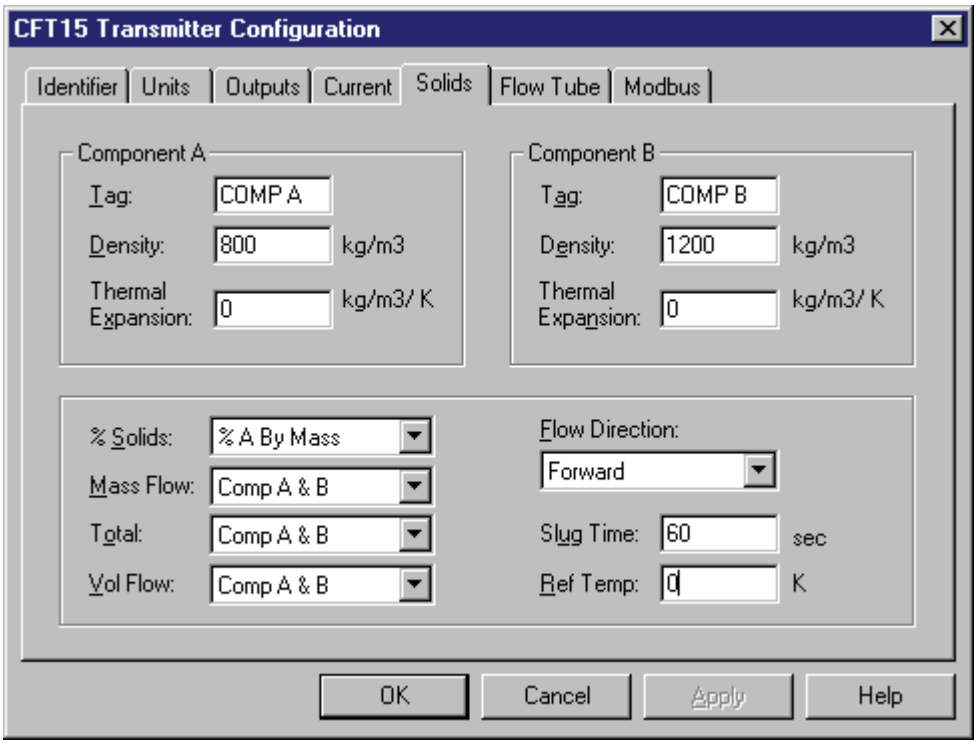


Figure G-7. Sample CFT15 Solids Tab Screen

Field	Entry
Component A	
Tag	Enter maximum of six characters.
Density	Enter value.
Thermal Expansion	Enter value.
Component B (Similar to Component A).	
Mode Settings	
% Solids	Select **% A by Mass**, **% B by Mass**, **% A by Vol**, or **% B by Vol**.
Mass Flow	Select **Comp A Only**, **Comp B Only**, or **Comp A + B**.
Volume Flow	Select **Comp A Only**, **Comp B Only**, or **Comp A + B.**
Total	Select **Comp A Only**, **Comp B Only**, or **Comp A + B**.
General Settings	
Flow Direction	Select **Forward**, **Positive BiDirect**, **Negative BiDirect**, or **Reverse**.

Field	Entry
Slug Time	Enter allowable time for flow slug to exist before alarm is triggered. Specify in multiples of 10 seconds from 10 to 2550 seconds.
Ref Temp	Enter value.

Flowtube Tab Screen

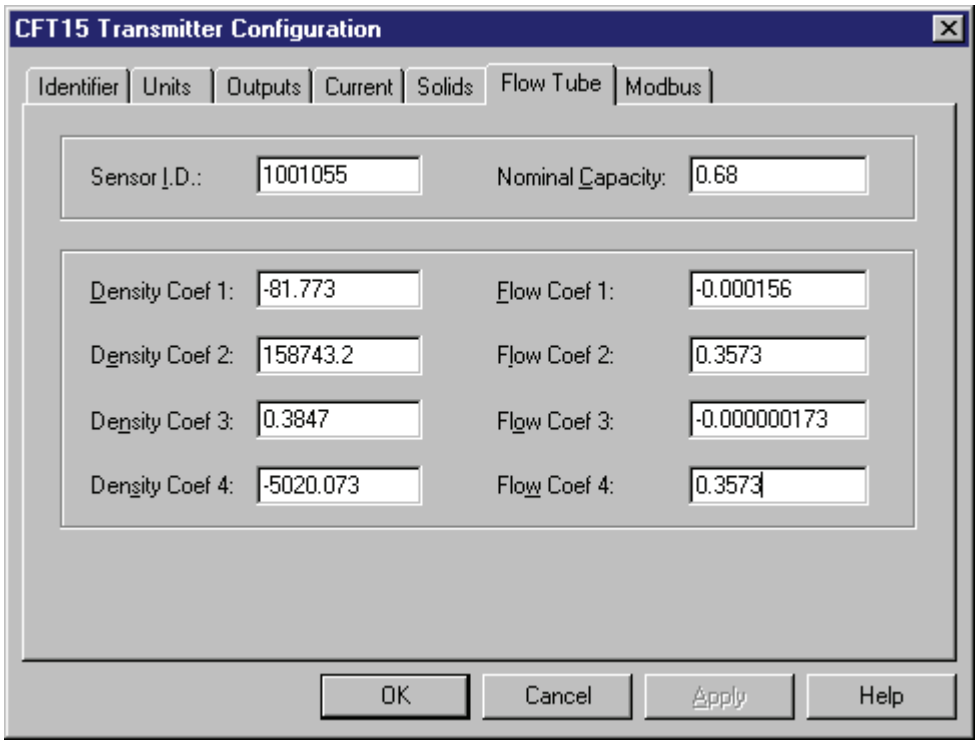


Figure G-8. Sample CFT15 Flowtube Tab Screen

Field	Entry
Sensor I.D.	Enter data from flowtube data plate.
Density Coef 1	
Density Coef 2	
Density Coef 3	
Density Coef 4	
Nominal Capacity	
Flow Coef 1	
Flow Coef 2	
Flow Coef 3	
Flow Coef 4	

Modbus Tab Screen

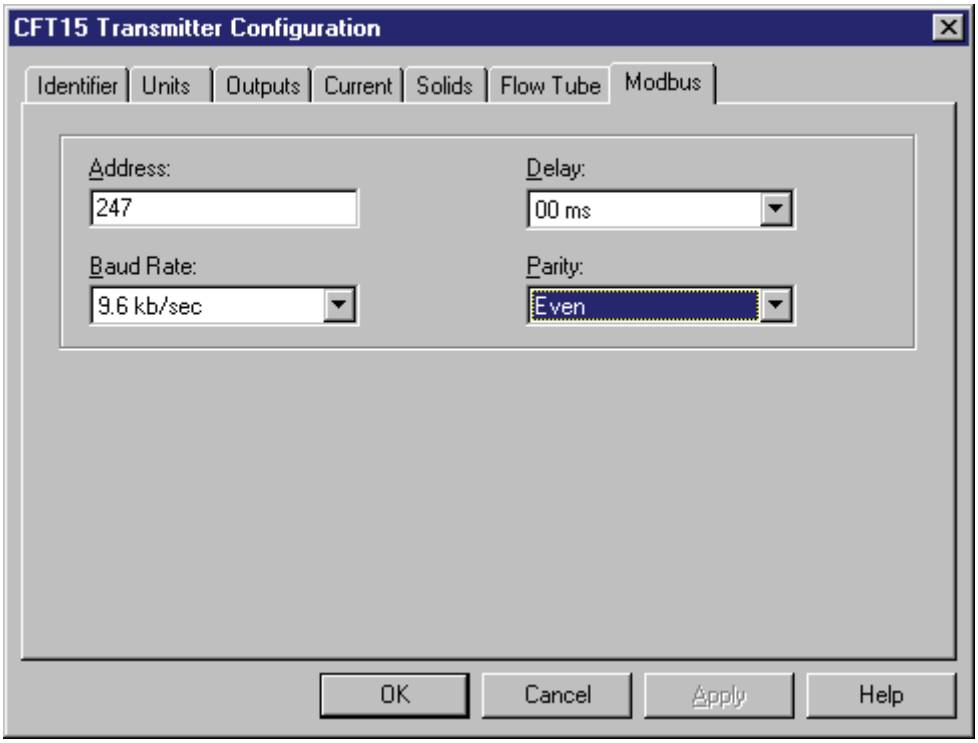


Figure G-9. Sample CFT15 Modbus Tab Screen

Field	Entry
Address	Enter address from 1 to 247.
Baud Rate	Select **1.2**, **2.4**, **4.8**, **9.6**, or **19.2 kb/second**.
Delay	Select **0**, **20**, **50**, **150**, or **300**.
Parity	Select **Odd**, **Even**, or **None.**

Database Report

Table 31. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type	21	Curr 1 l/Pulse 3	0
Tag Number	TEST TAG NUM	Curr 1 l/Pulse 4	0
Tag Name	CORIOLIS METER	Curr 2 l/Pulse 1	0
Device Name	COR001	Curr 2 l/Pulse 2	1
Geo Location	DEFAULT LOCAT.	Curr 2 l/Pulse 3	0
Mass Flow Units	kg/s	Curr 2 l/Pulse 4	0
Density Units	kg/m3	Curr 3 l/Pulse 1	0
Temperature Units	K	Curr 3 l/Pulse 2	1
Total Units	kg	Curr 3 l/Pulse 3	0
Vol Flow Units	l/s	Curr 3 l/Pulse 4	0
Comp A Label	COMP A	Clock Calibration	5e-007
Comp B Label	COMP B	Xmtr Serial Num	1
Slug Flow (/10)	06	Xmtr Manuf Plant	00
Pulse Out Slope	1	Dbase Chng Count	ff
Pulse Out Offset	0	Init Required	00
Mass Flow Slope	1	Processor Brd Temp	9c
Density Slope	1	Current Brd Temp	99
Temperature Slope	1	RTD Ohms	191.9533
Total Slope	1	Totalize Option	82
Vol Flow Slope	1000	Modbus Address	f7
Mass Flow Offset	0	Modbus Baudrate	03
Density Offset	0	Modbus Delay Time	00
Temperature Offset	0	Modbus Parity	02
Total Offset	0	Current 1 Control	01
Vol Flow Offset	0	Current 1 Slope	1
Density Comp A	800	Current 1 Offset	0
Density Comp B	1200	Current 1 Preset	0.5
Density Ref Temp	0	Current 2 Control	01
Thermal Exp A	0	Current 2 Slope	1
Thermal Exp B	0	Current 2 Offset	0
Pulse Out Control	01	Current 2 Preset	0.5
Alarm 1 Control	02	Current 3 Control	01
Alarm 2 Control	04	Current 3 Slope	1
Gen Func Cntrl 1	00	Current 3 Offset	0
Gen Func Cntrl 2	00	Current 3 Preset	0.5
Pulse Out Preset	0.5	Slug Recovery	0
Alarm 1 Level	300	Device Type	21
Alarm 2 Level	30	Xmtr Serial No	1
Alarm 1 Hysteresis	50	Plant Code	00
Alarm 2 Hysteresis	5	Major Rev Number	30 31
Flow Zero Offset	0	Minor Rev Number	30 35
Tube Serial No.	1	Firmware Update No	30 30 30
Dens Coef 1	0	Diagnostic Error	00 00

Table 31. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Dens Coef 2	10000	Format code for TOTA	00
Dens Coef 3	0		
Dens Coef 4	0		
Nominal Capacity	1000		
Flow Coef 1	0		
Flow Coef 2	1		
Flow Coef 3	0		
Flow Coef 4	1		
Phase In Cal 1	0		
Phase In Cal 2	1		
Phase In Cal 3	0		
Phase In Cal 4	0		
Neg Phase Cal 1	0		
Neg Phase Cal 2	1		
Neg Phase Cal 3	0		
Neg Phase Cal 4	0		
RTD Res to Temp 1	0		
RTD Res to Temp 2	40		
RTD Res to Temp 3	0		
RTD Res to Temp 4	0		
Curr 1 I/Pulse 1	0		
Curr 1 I/Pulse 2	1		

Appendix H. 83 Series Vortex Flowmeters

This appendix provides information that is exclusive to the Foxboro Vortex Flowmeters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

NOTE

Version 2.0 of the IFDC/PC20 software incorporates full configuration capability for the HART 83 Series Vortex Transmitters. Any HART 83 Series database saved to your computer hard disk for Version 1.0 is not usable for Version 2.0. Therefore, delete Version 1.0 files and save new files from your transmitter using Version 2.0 software.

Device Data Screen

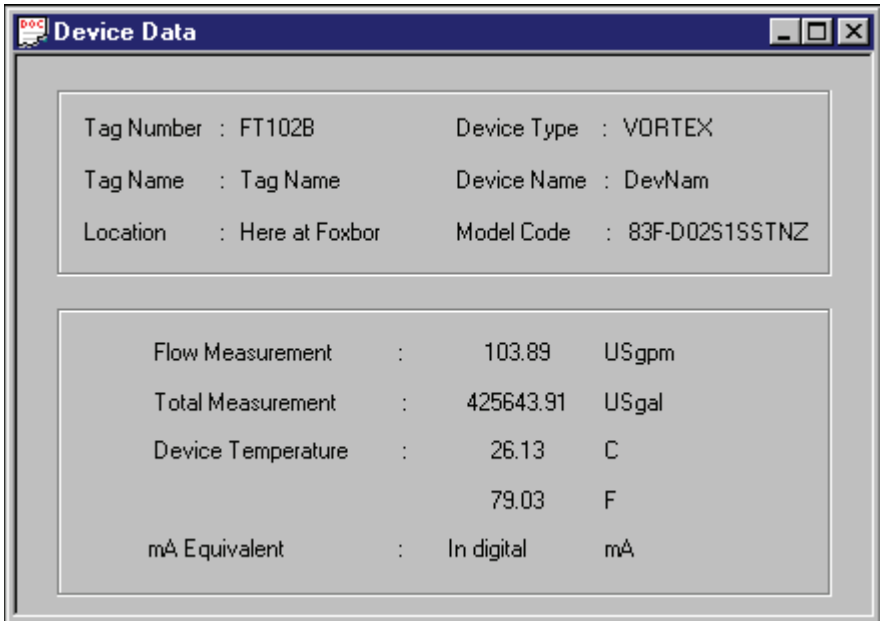

Device Data
Tag Number : FT102B
Device Type : VORTEX
Tag Name : Tag Name
Device Name : DevNam
Location : Here at Foxbor
Model Code : 83F-D02S1SSTNZ
Flow Measurement : 103.89 USgpm
Total Measurement : 425643.91 USgal
Device Temperature : 26.13 C
79.03 F
mA Equivalent : In digital mA

Figure H-1. Sample Vortex Device Data Screen (FoxCom Device)

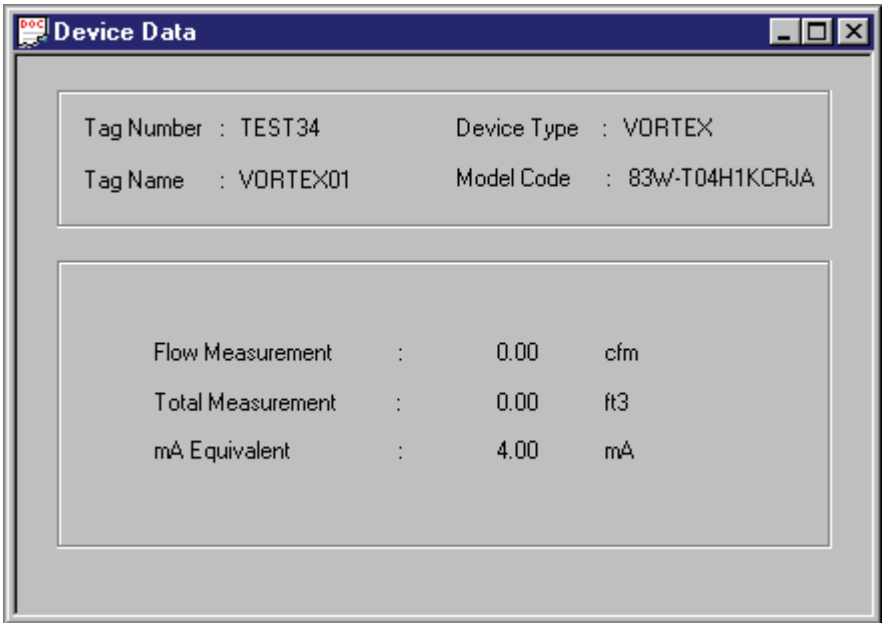

Device Data
Tag Number : TEST34
Device Type : VORTEX
Tag Name : VORTEX01
Model Code : 83W-T04H1KCRJA
Flow Measurement : 0.00 cfm
Total Measurement : 0.00 ft3
mA Equivalent : 4.00 mA

Figure H-2. Sample Vortex Device Data Screen (HART Device)

Error Messages

Status Error Messages

Table 32. Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Busy	Transmitter is busy.	If problem persists, select **Test > Go On-line**. If this does not clear problem, cycle power and if necessary replace the electronic module.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-line**. If this does not clear problem, cycle power and if necessary replace the electronic module.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Error Messages to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Device Busy	Set if EEPROM write is in progress and pending.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, cycle power and if necessary replace the electronic module.

Table 32. Status Error Messages (Continued)

Message	Explanation	Recommended Action
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-line**. If this does not clear problem, cycle power and if necessary replace the electronic module.
Electronics Error	Electronics cannot calculate correct flow.	Select **Test > Go On-line**. If this does not clear problem, cycle power and if necessary replace the electronic module.
Sensor Output High		
Temp Out of Range	Transmitter temperature is less than -40°C or higher than 80°C.	Check ambient and process temperature.

Diagnostic Error Messages

Table 33. Diagnostic Error Messages

Code	Error Message	Recommended Action
02	ROM Checksum Error	Replace electronic module.
03	EEPROM Chksum Err	If this does not clear problem, replace electronic module.
04	RAM Error	Replace electronic module.
0A	Flowrate Math Error	Check transmitter database and correct any problems. If problem persists, replace electronic module.
0C	Sensor Elec Failure	Cycle power. If problem persists, replace electronic module.
0E	Core Failure	Cycle power. If problem persists, replace electronic module.
2F	Offline Cfg Write Error	Take transmitter off-line, modify a parameter or mode, change parameter or mode back to previous value and place transmitter on-line.
10	Core Failure	Cycle power. If problem persists, replace electronic module.
28	Xmtr Temp Low	Check process temperature.
29	Xmtr Temp High	Check process temperature.

Calibration

You can perform the following calibration procedures on a Vortex Transmitter using the Intelligent Field Device Configurators:

- ReRange

- Zero Total
- Set Low Flow Cut-In
- mA Calibration.

ReRange

This function permits you to change the Flow Upper Range Value (URV).

1. Select **ReRange** from the **Calibration** menu or the ReRange icon from the device toolbar.
2. Follow the prompt to put the device in Manual control mode and select **Continue**.
3. To rerange to another input span, enter the desired upper range value and select **Continue**.
4. Select **Continue** again to save the new range to the device.
5. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurements.

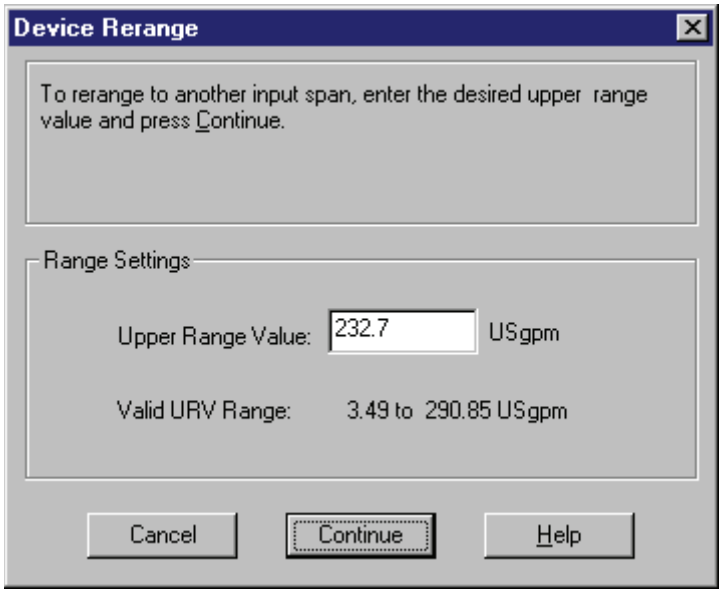


Figure H-3. Sample Vortex ReRange Screen

Zero Total

This function permits you to reset the transmitter total to zero. The procedure follows:

1. Select **Zero Total** from the **Calibration** menu or the Zero Total icon from the device toolbar.
2. Follow the prompt to put the device in Manual control mode and select **Continue**.
3. Select **Continue** again to reset the transmitter total measurement to zero.

4. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurements.

Set Low Flow Cut-In

This function permits you to set the low flow cut-in level for the transmitter. You can also set a manual low flow cut-in level. To execute the operation, use the following procedure:

1. Select **Low Flow Cut-In** from the **Calibration** menu or the Low Flow Cut-In icon from the device toolbar.
2. Follow the prompt to put the device in Manual control mode and select **Continue**.
3. For a FoxCom device, select the desired **Low Flow Cut-In** value or select **Automatic** to set low flow cut-in to lowest setting with no false signal detected under **no flow** conditions. Select **Continue** when done.
   For a HART device, select **Increment** or **Decrement** to obtain the desired **Low Flow Cut-In** value or select **Automatic** to set low flow cut-in to lowest setting with no false signal detected under **no flow** conditions. Select **Continue** when done.

NOTE

Before selecting Automatic, it is important that flow be stopped.

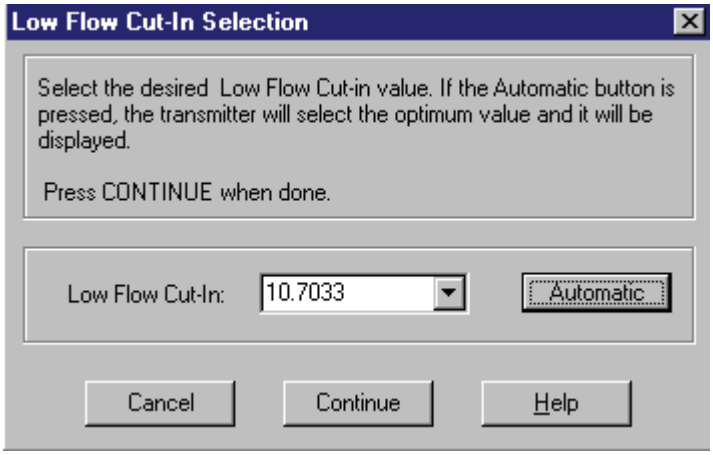

Low Flow Cut-In Selection
Select the desired Low Flow Cut-in value. If the Automatic button is pressed, the transmitter will select the optimum value and it will be displayed.
Press CONTINUE when done.
Low Flow Cut-In:
10.7033
Automatic
Cancel
Continue
Help

Figure H-4. Sample Vortex Low Flow Cut-In Screen (FoxCom Device)

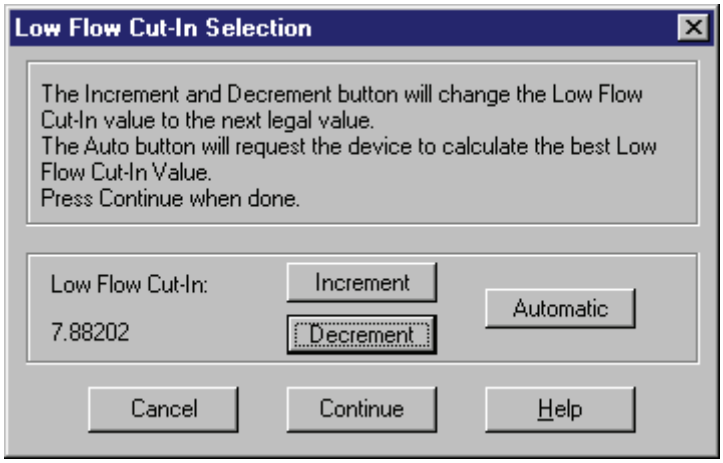

Low Flow Cut-In Selection
The Increment and Decrement button will change the Low Flow Cut-In value to the next legal value.
The Auto button will request the device to calculate the best Low Flow Cut-In Value.
Press Continue when done.
Low Flow Cut-In:
7.88202
Increment
Decrement
Automatic
Cancel
Continue
Help

Figure H-5. Sample Vortex Low Flow Cut-In Screen (HART Device)

4. Wait while the new **Low Flow Cut-In** value is set.
5. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

FoxCom Device

The procedure to perform a mA Calibration on a FoxCom device is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
1. Select **mA Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual control mode and select **Continue**.
3. Select **4 mA Output**.
4. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
5. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
6. Select **20 mA Output**.
7. Repeat Steps 4 and 5. When finished, select **Continue**.
8. The screen then displays the adjustment. To accept this change, select **Continue**.
9. Follow the prompt to put the device back into Automatic control mode. Select **Continue** to resume dynamic measurement.

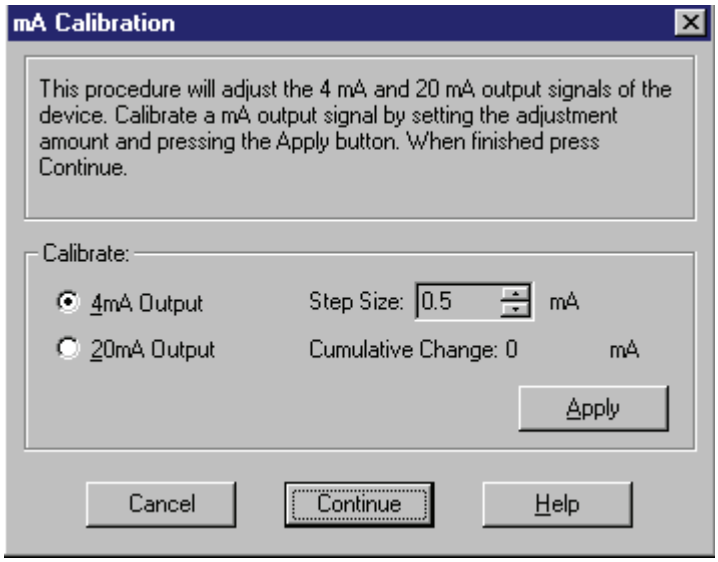

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure H-6. Sample Vortex mA Calibration Screen (FoxCom Device)

HART Device

The procedure to perform a mA Output Calibration on a HART device is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.
5. Enter the value from the mA meter in the **Measured Value** field on your screen and select **Apply**.
6. Repeat Step 4 until the **Measured Value** equals the value on the meter.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5.
9. Select **Continue** to save the calibration to the transmitter.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

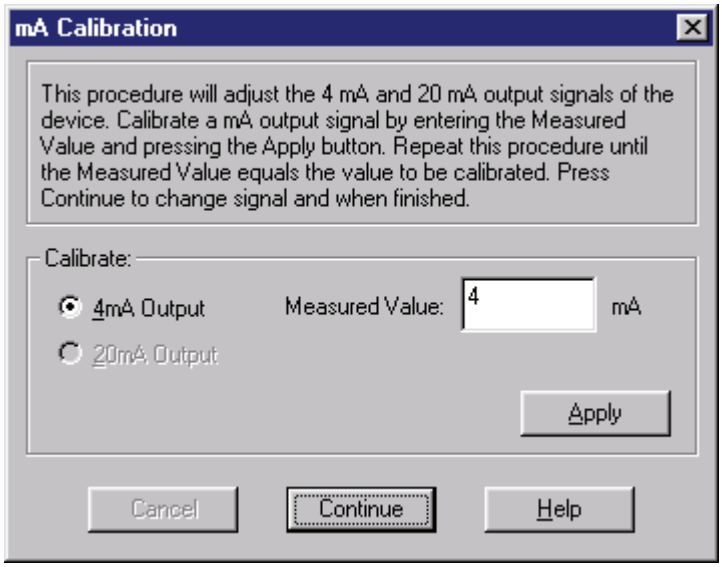

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by entering the Measured Value and pressing the Apply button. Repeat this procedure until the Measured Value equals the value to be calibrated. Press Continue to change signal and when finished.
Calibrate:
4mA Output
Measured Value:
4
mA
20mA Output
Apply
Cancel
Continue
Help

Figure H-7. Sample mA Calibration Screen (HART Device)

Configuration

Identifier Tab Screen

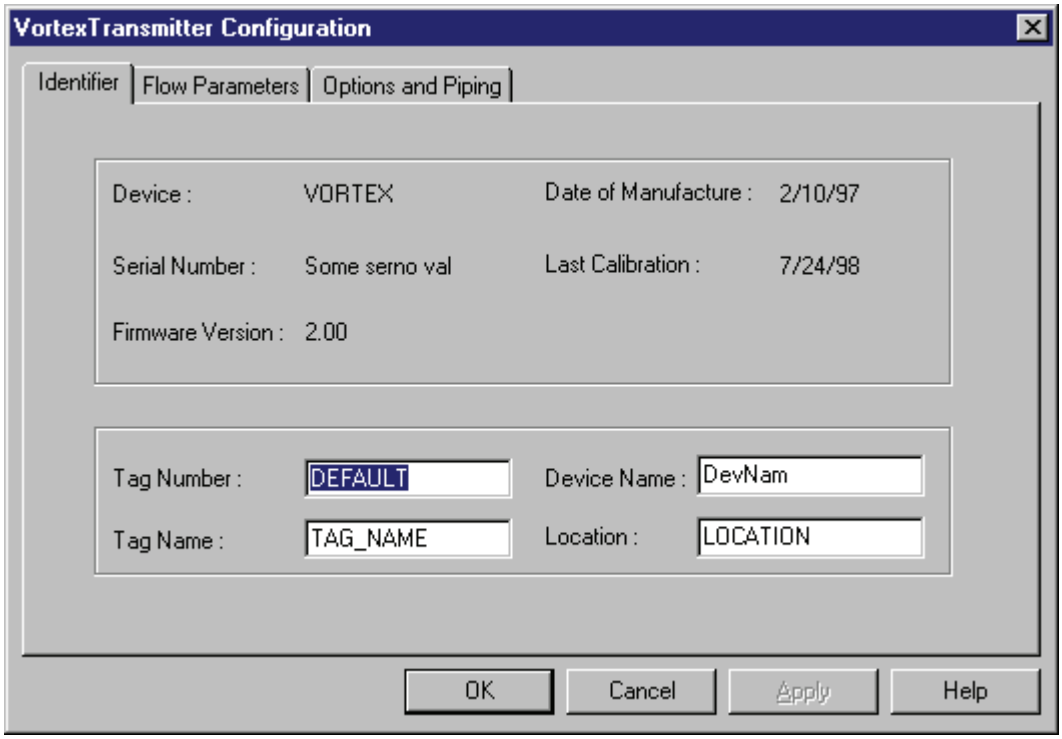


Figure H-8. Sample Vortex Flowmeter Identifier Tab Screen (FoxCom Device)

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters with a FoxCom device. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only with FoxCom device.

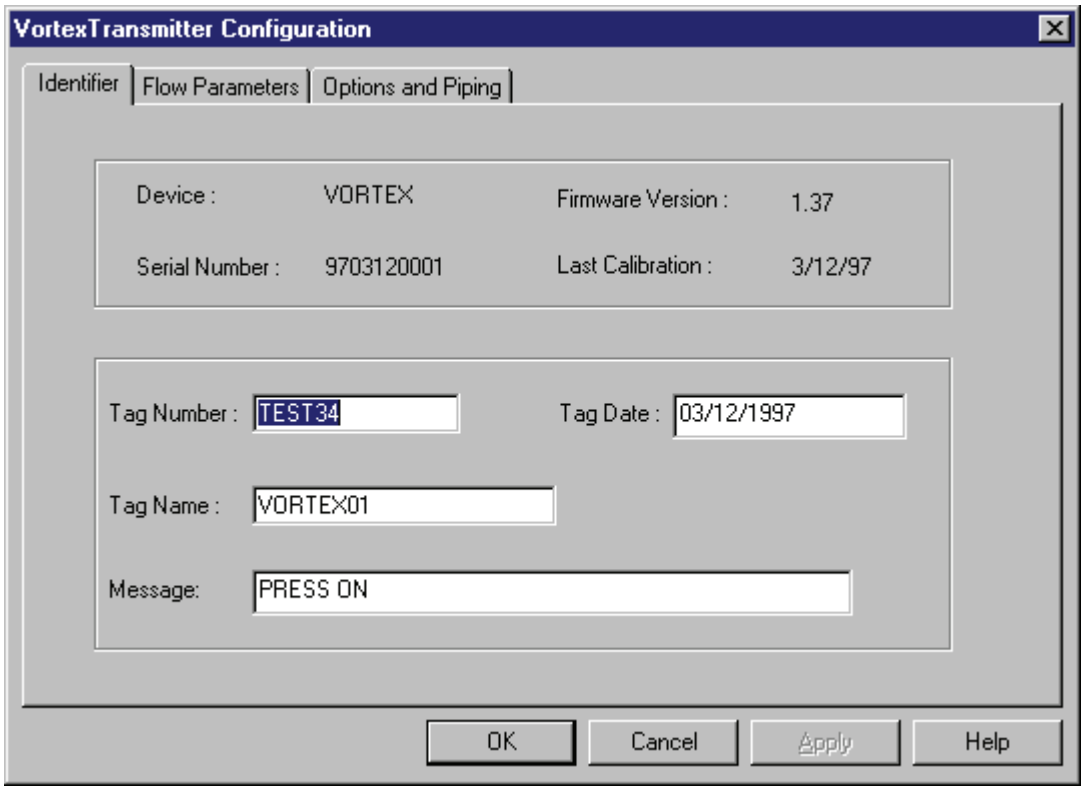


Figure H-9. Sample Vortex Flowmeter Identifier Tab Screen (HART Device)

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Date	Enter maximum of 10 characters. Optional, used for reference only.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Message	Enter message. Optional, used for reference only.

Flow Parameters Tab Screen

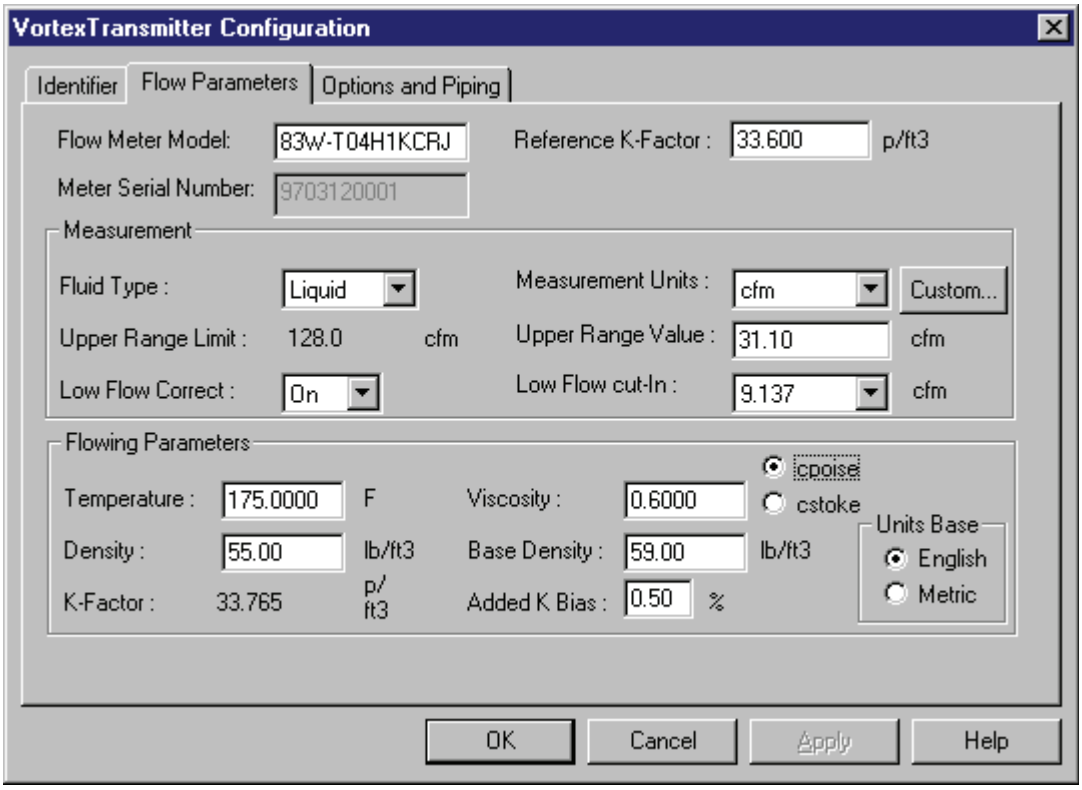


Figure H-10. Sample Vortex Flow Parameters Tab Screen

Field	Entry
Flow Meter (Sensor) Model	Enter Model Number.
Reference K-Factor	Enter Reference K-Factor.
Meter Serial Number	Shows Serial Number (if HART device).
Measurement	
Fluid Type	Select **Liquid**, **Gas**, or **Steam**.
Upper Range Limit	Shows value of Upper Range Limit of the flowmeter.
Low Flow Correct	Specify **On** or **Off**.
Measurement Units	Select from menu of flow units or select **Custom** to enter user-configured units.
Upper Range Value	Enter Upper Range Value in measurement units shown.
Low Flow Cut-In	Select from menu of values.
Flowing Parameters	
Temperature	Enter temperature in units shown.
Density	Enter density in units shown. Defaults are Liquid: 62.30, Gas: 0.5858, and Steam: 0.2992 lb/ft^3.

Field	Entry
K-Factor	Shows K-Factor in units shown.
Viscosity	If liquid, enter viscosity.
Base Density	If gas, enter value in same units as Density (above).
Added K Bias	Enter value in percent.
Units Base	Select **English** or **Metric**.

Options and Piping Tab Screen

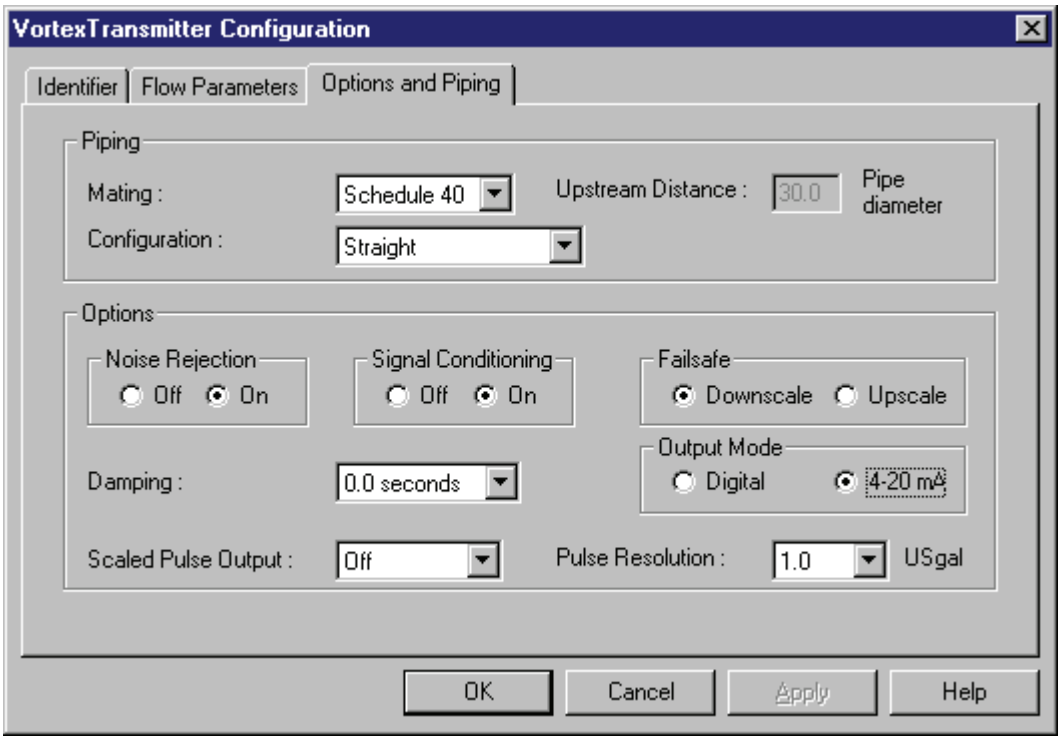


Figure H-11. Sample Vortex Options and Piping Tab Screen (FoxCom Device)

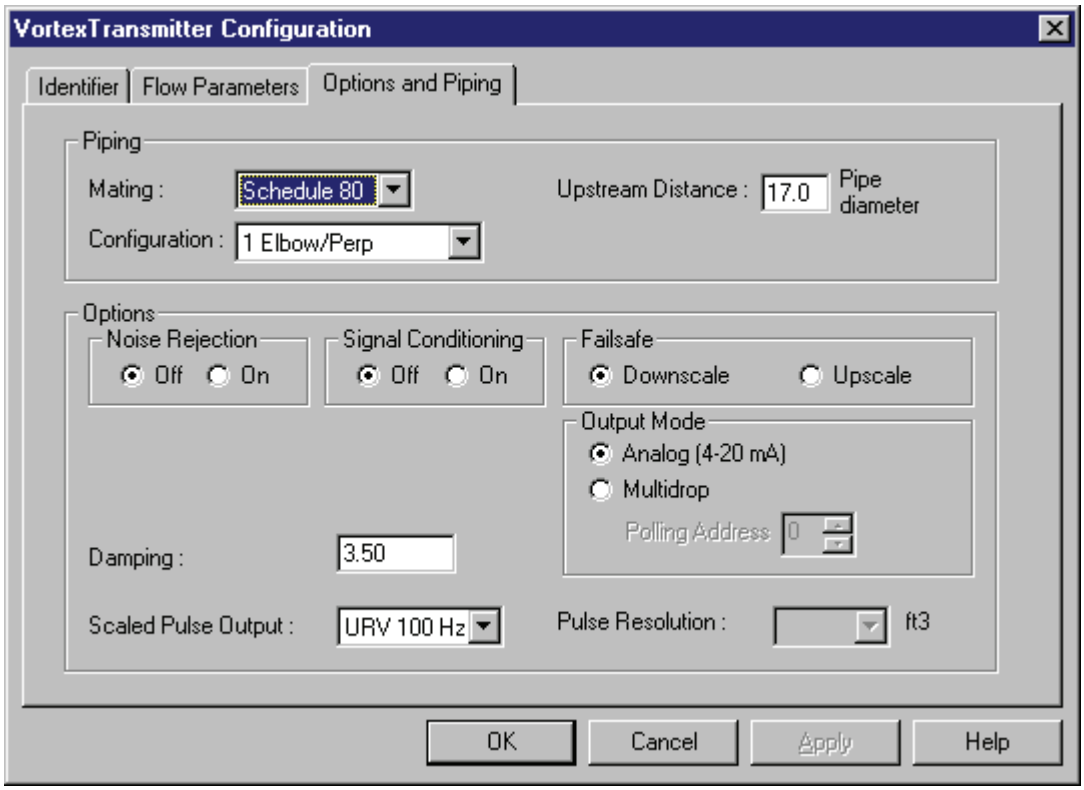


Figure H-12. Sample Vortex Options and Piping Tab Screen (HART Device)

Field	Entry
Piping	
Mating	Select **Schedule 10**, **Schedule 40**, **Schedule 80**, **PN16**, **PN40**, **PN64**, or **PN100**.
Configuration	Select from menu of piping configurations.
Upstream Distance	If **Configuration** is not **Straight**, enter distance in pipe diameters.
Options	
Noise Rejection	Select **On** or **Off**.
Signal Conditioning	Select **On** or **Off**.
Failsafe	If **Output Mode** is **Analog**, select **Downscale** or **Upscale**.
Damping	Select one of nine choices from **No Damping** through **32** seconds.
Scaled Pulse Output	Select **Off** or **URV 100 Hz**.
Output Mode (FoxCom)	Select **Digital** or **4-20 mA**.
Output Mode (HART)	Select **Analog (4-20 mA)** or **Multidrop.**
Polling Address	If **Multidrop**, select number from **0** through **15**.
Pulse Resolution	Select **0.01**, **0.1**, **1.0**, **10.0**, **100.0**, or **1000.0**.

Database Report

Table 34. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	33	REV_INFO	bd
Tag Number	DEFAULT	IGN2	1/22/23
Tag Name	TAG_NAME	Sensor Minor Rev #	00
Device Name	DevNam	Sensor Major Rev #	02
Geo Location	LOCATION	IGN3	256
Reference Number	Some serno val	IGN4	150
Model Code	83F-D02S1SSTNZ	IGN5	89
Core Number	02 0c		
Core Manufact. Date	2/10/97		
Flow Meas Units	USgpm		
Total Meas Units	USgal		
Upper Range Value	232.7		
Lower Range Value	0		
Low Flow Cut In	2.32683		
Upper Range Limit	232.683		
Low Flow Cut In Set	0		
Reference K-Factor	258		
Meas #1 Damping	0		
Flow Units Slope	448.83		
Total Units Slope	7.48052		
Pulse Resolution	3		
Meas #1 EGU Type	00		
Fluid Type	00		
Temperature Units	00		
Flowing Temperature	70		
Density Units	00		
Flowing Density	62.3		
Base Density	62.37		
Viscosity Units	00		
Fluid Viscosity	0.9753		
Mating Pipe	1		
Added K-Fac. Bias	0		
Piping Configuration	00		
Upstream Distance	30		
Piping Bias	0		
Output Mode	00		
Strategy Flag	08		
Scaled Pulse Output	00		
Noise Rejection	01		
Signal Conditioning	01		
Low Flow Correction	00		
Flowing K-Factor	34.48958		

Table 34. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Lo Freq Filter	65535		
Hi Freq Filter	65535		
Calibrator's Initial	NOTYOU		
Calibration Date	7/24/98		
TON Count (20 mA)	33600		
TON Count (4 mA)	8162		
Measurement Mapping	01 01 02 03		
Local Disp Password	VORTEX		
Database Change Flag	62		
Kernal Major Rev #	01		
Kernal Minor Rev #	00		
SREVMAJ	01		
SREVMIN	0a		
Display Major Rev #	00		
Display Minor Rev #	00		
Parameter Tbl Offset	aa cf		
Parameter Table CRC	2d 94		
Parameter Table Type	00		
Parameter Table Size	00 85		
Reserved	00 00 00		
Manifold Setting	1		
Slave Revision Numbe	259		

Appendix I. 870ITEC Transmitters

This appendix provides information that is exclusive to the 870ITEC transmitters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

Device Data Screen

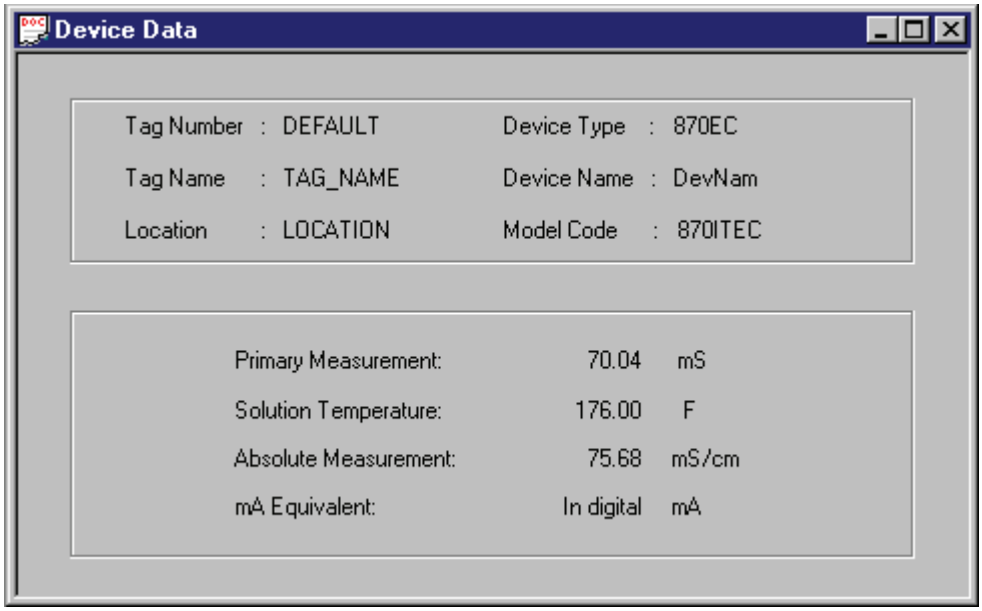


Figure I-1. Sample 870ITEC Device Data Screen

Error Messages

Table 35. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Measurement Error	Unstable process measurement.	Check sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Stability Error	Raw measurement has been unstable.	Check wiring. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Probe Error	Problem with the sensor.	Replace sensor.
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Amplifier Error	Out of range error.	Check sensor. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Extended Status - Hardware		
ATC Open	Resistance of temperature compensation is greater or less than expected resistance of device configured.	Replace temperature compensator.
ATC Short		
Leak Error	Solution leakage into sensor.	Replace sensor.
App1 Cal Req	Application 1 calibration required.	Calibrate.

Table 35. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
App2 Cal Req	Application 2 calibration required.	Calibrate.
App3 Cal Req	Application 3 calibration required.	Calibrate.
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact the CSC.
Cal Slope Error	A slope error has occurred as the result of the previous calibration.	Check sensor and recalibrate transmitter If the problem persists, contact the CSC.
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact the CSC.
Therm Cal Tolerance	Thermistor calibration is not within tolerance.	Recalibrate the thermistor. If problem persists, contact the CSC.
Tune Stability	Calibration measurement not stabilized.	Check stability configuration or replace sensor.
Amp Failure	Overrange condition on raw measurement.	Check sensor and transmitter connections. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Extended Status - Process		
mA Under Range	Measurement under or over configured range.	Reconfigure range or correct process error.
mA Over Range		
Comp Under Range	Measurement under or over compensation range.	Reconfigure compensation or correct process error.
Comp Over Range		
Disp Under Range	Primary measurement is too low or too high.	Check sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Disp Over Range		
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.

Calibration

You can perform the following calibration procedures on an 870ITEC transmitter using the Intelligent Field Device Configurators:

- Bench Calibration
- Solution 1-Point Span

- Solution 1-Point Offset
- Solution 2-Point
- Temperature Sensor
- mA Calibration.

Bench Calibration

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 203.
2. Select **Bench Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

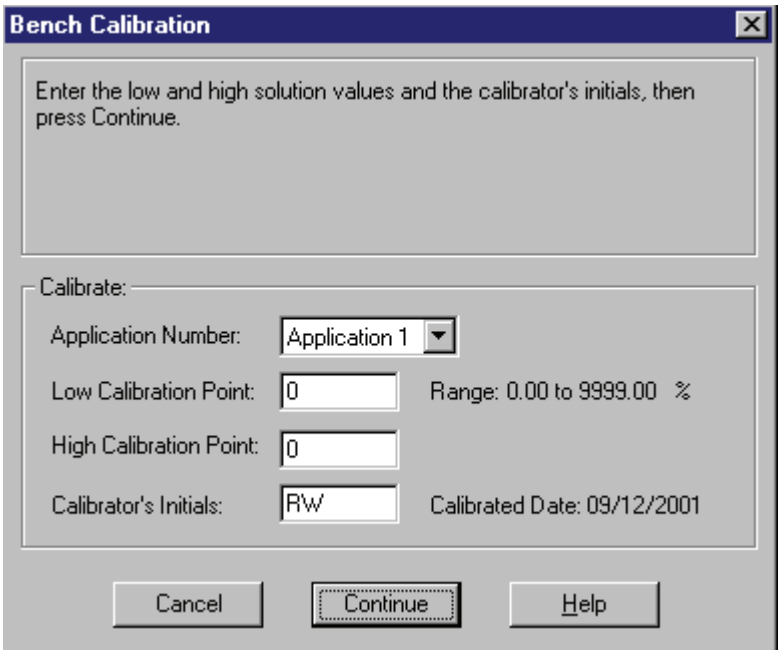


Figure I-2. Sample 870ITEC Bench Calibration Screen

4. Enter the high and low solution values and the calibrator's initials, and select **Continue**.
5. Place the clean dry sensor in air and select **Continue**.
6. Wait while the device is calibrating.
7. Run a wire through the sensor bore and connect to a decade resistance box. Adjust the box to a resistance equal to the high calibration point [see *870ITEC Electrodeless Conductivity Transmitters* (MI 611-212) for calculation of this resistance] and select **Continue**.
8. Wait while the device is calibrating. The current calibration date is automatically updated.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Offset

This option permits you to set a 1-point offset for up to three applications and is normally used to correct for zero shift. This should be used only if you have previously performed a 2-point calibration.

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 203.
2. Select **Solution 1-Point Offset** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

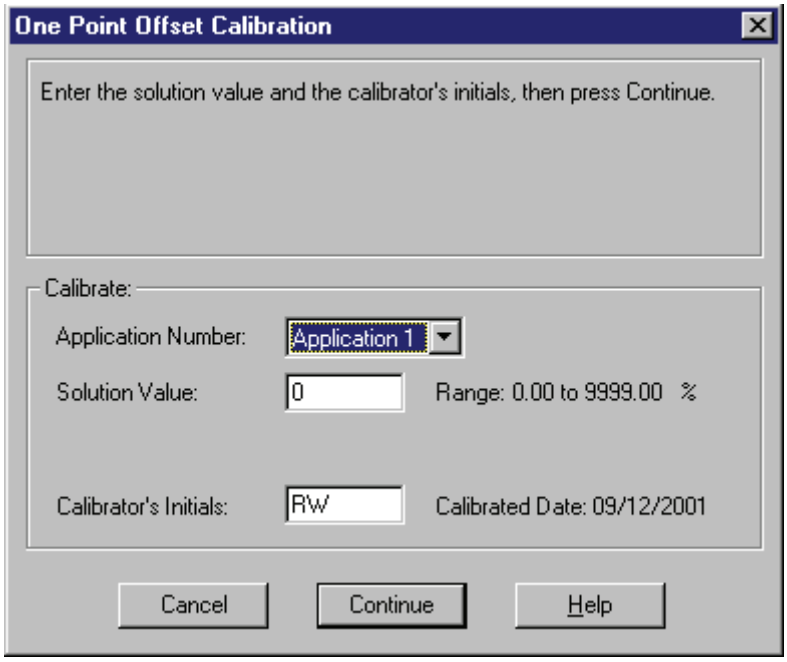


Figure I-3. Sample 870ITEC Solution 1-Point Offset Screen

4. Enter the solution value and the calibrator's initials, and select **Continue**.
5. Immerse the sensor in the solution and select **Continue**.
6. Wait while the device is calibrating. The current calibration date is automatically updated.
7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Span

This option permits you to set a calibration point (1-point span) for up to three applications. This is usually done to correct for a cell factor change due to installation. It should be used only if you have previously performed a 2-point calibration.

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 203.
2. Select **Solution 1-Point Span** from the **Calibration** menu.

3. Follow the prompt to put the device in Manual mode and select **Continue**.

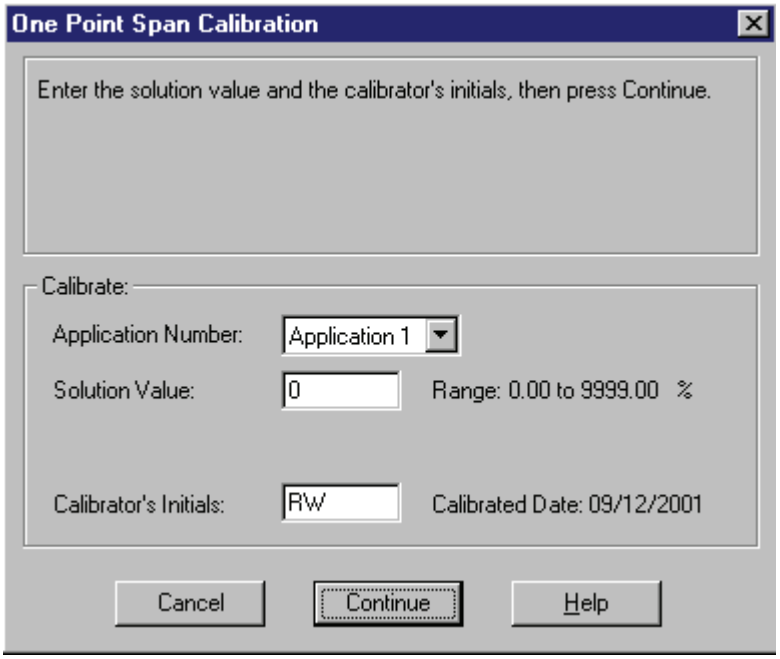


Figure I-4. Sample 870ITEC Solution 1-Point Span Screen

4. Enter the solution value and the calibrator's initials, and select **Continue**.
5. Immerse the sensor in the solution and select **Continue**.
6. Wait while the device is calibrating. The current calibration date is automatically updated.
7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 2-Point

This option permits you to perform a 2-point calibration for up to three applications.

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 203.
2. Select **Solution 2-Point** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

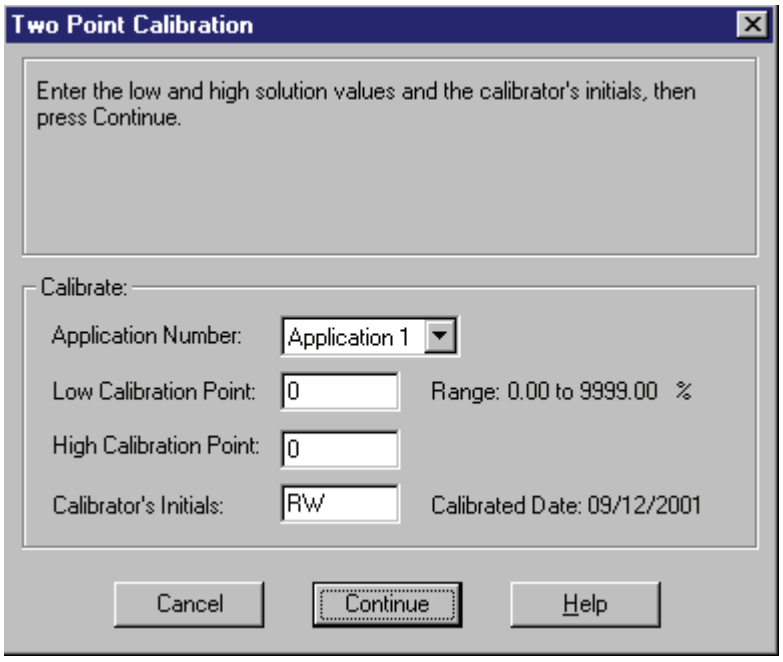


Figure I-5. Sample 870ITEC Solution 2-Point Calibration Screen

4. Enter the low and high solution values and the calibrator's initials, and select **Continue**.
5. Immerse the sensor in the low calibration solution and select **Continue**.
6. Wait while the device is calibrating.
7. Immerse the sensor in the high calibration solution and select **Continue**.
8. Wait while the device is calibrating. The current calibration date is automatically updated.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor Calibration

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 203.
2. Select **Temperature Sensor** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

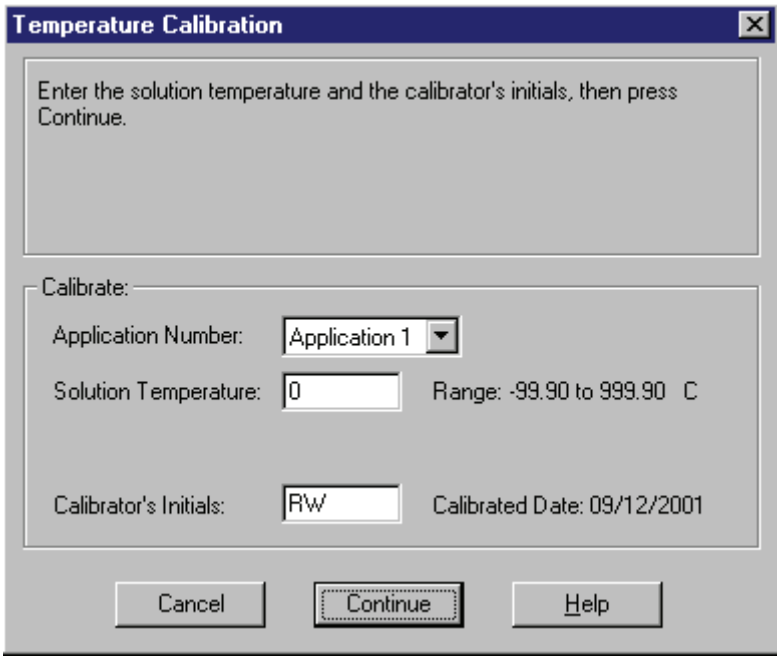


Figure I-6. Sample 870ITEC Temperature Calibration

4. Enter the solution temperature and the calibrator's initials, and select **Continue**.
5. Immerse the sensor in the solution and select **Continue**.
6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

The procedure to perform a mA Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

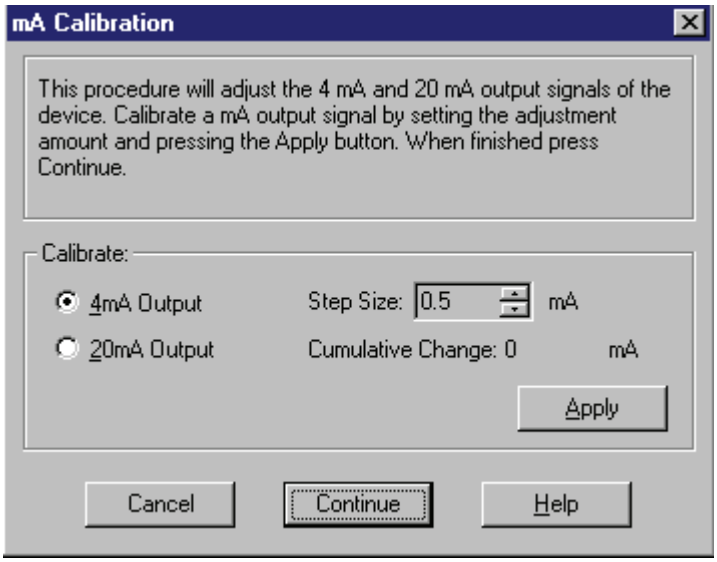

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure I-7. Sample 870ITEC mA Calibration Screen

5. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown in the screen.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

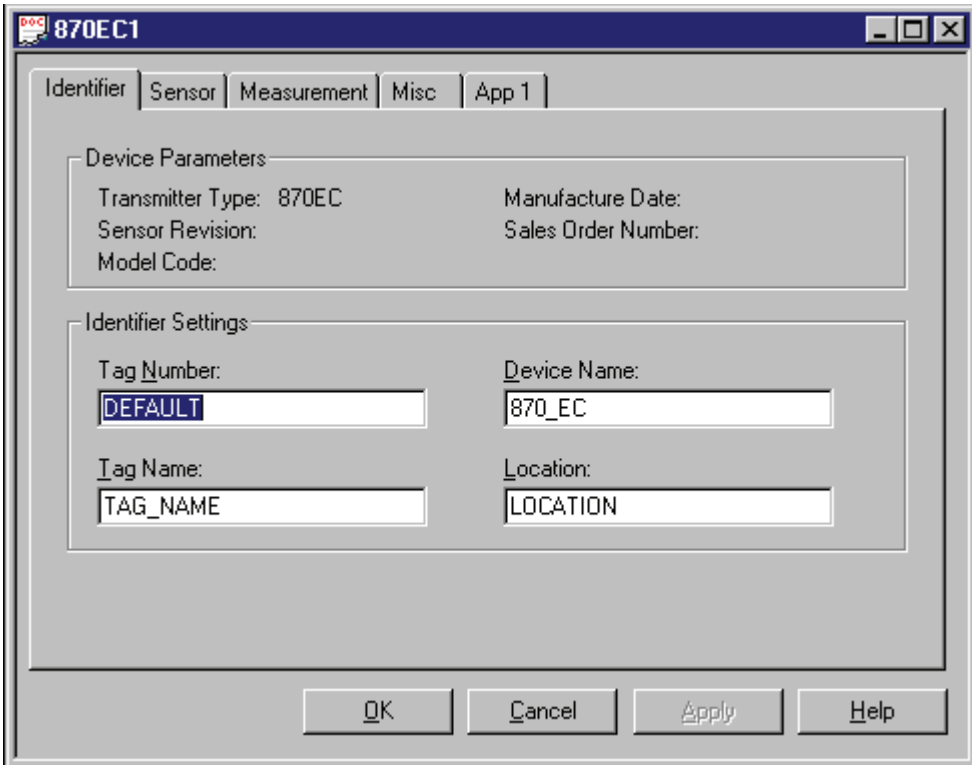


Figure I-8. Sample 870ITEC Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

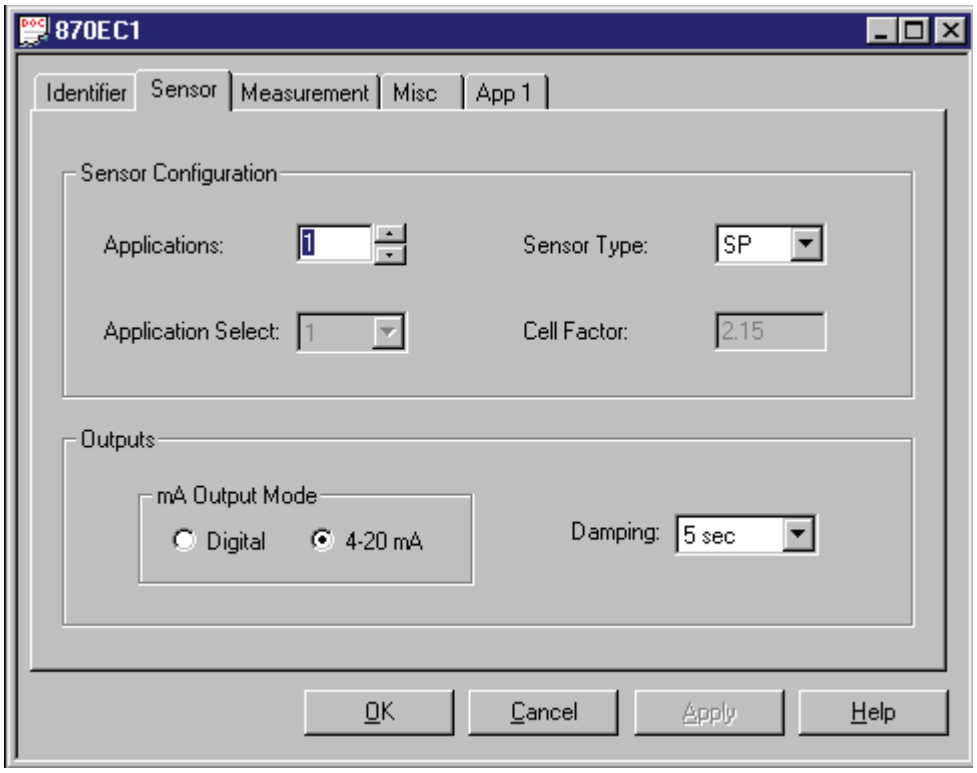


Figure I-9. Sample 870ITEC Sensor Tab Screen

Field	Entry
Sensor Configuration	
Applications	Number of applications to be configured. Select **1**, **2**, or **3** applications.
Application Select	Select **1**, **2**, **3** or **AUTO**.
Sensor Type	Select type of sensor from menu of choices.
Cell Factor	If sensor type is OTHER, specify cell factor between 00.00 and 99.99.
Outputs	
mA Output Mode	Select **Digital** or **4-20 mA**.
Damping	Select damping response time of **1**, **5**, **10**, **20**, **40**, or **120 seconds**.

Measurement Tab Screen

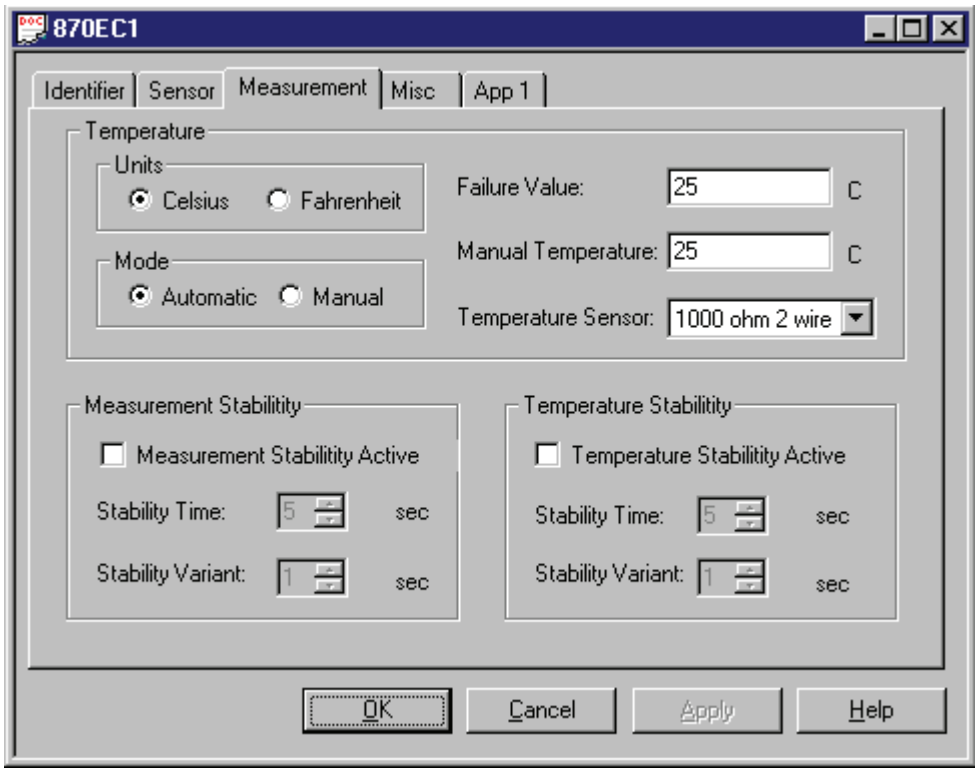


Figure I-10. Sample 870ITEC Measurement Tab Screen

Field	Entry
Temperature	
Units	Select **Celsius** or **Fahrenheit.**
Mode	Select **Automatic** (follows RTD) or **Manual** (fixed point).
Failure Value	If Mode is Automatic, enter temperature in case RTD fails.
Manual Temperature	If Mode is Manual, enter temperature.
Temperature Sensor	Select **2-wire 100** Ω, **2-wire 1000** Ω, **3-wire 100** Ω, or **3-wire 1000** Ω **RTD**, or **100 k**Ω thermistor.
Measurement Stability	
Measurement Stability Active	√ = Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off.
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.
Temperature Stability	
Temperature Stability Active	√ = Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off.
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.

Field	Entry
Stability Variant	If on, enter variant between 1 and 9.

Misc Tab Screen

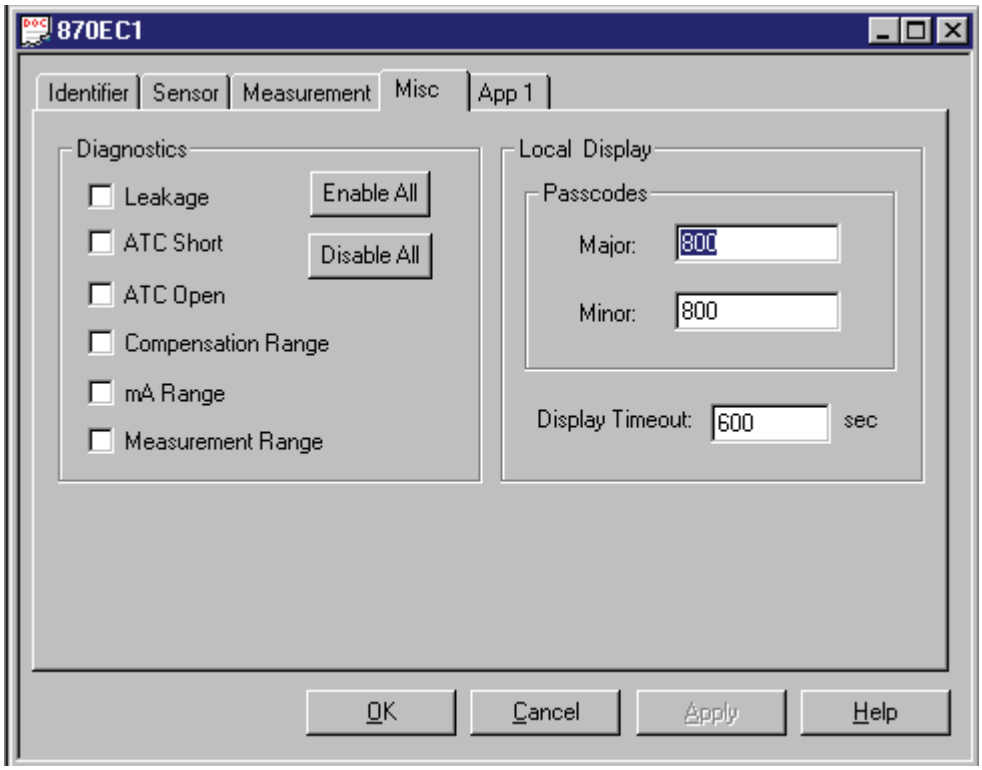


Figure I-11. Sample 870ITEC Misc Tab Screen

Field	Entry
Diagnostics	
Leakage	√ = Enable error messages; Blank = Disable error messages.
ATC Short	
ATC Open	
Compensation Range	
mA Range	
Measurement Range	
Enable All	Enables all messages listed above.
Disable All	Disables all messages listed above.
Local Display	
Major Passcode	Enter 4-digit passcode.
Minor Passcode	Enter 4-digit passcode.

Field	Entry
Display Timeout	Enter timeout between 0 and 999 seconds.

Application Tab Screen

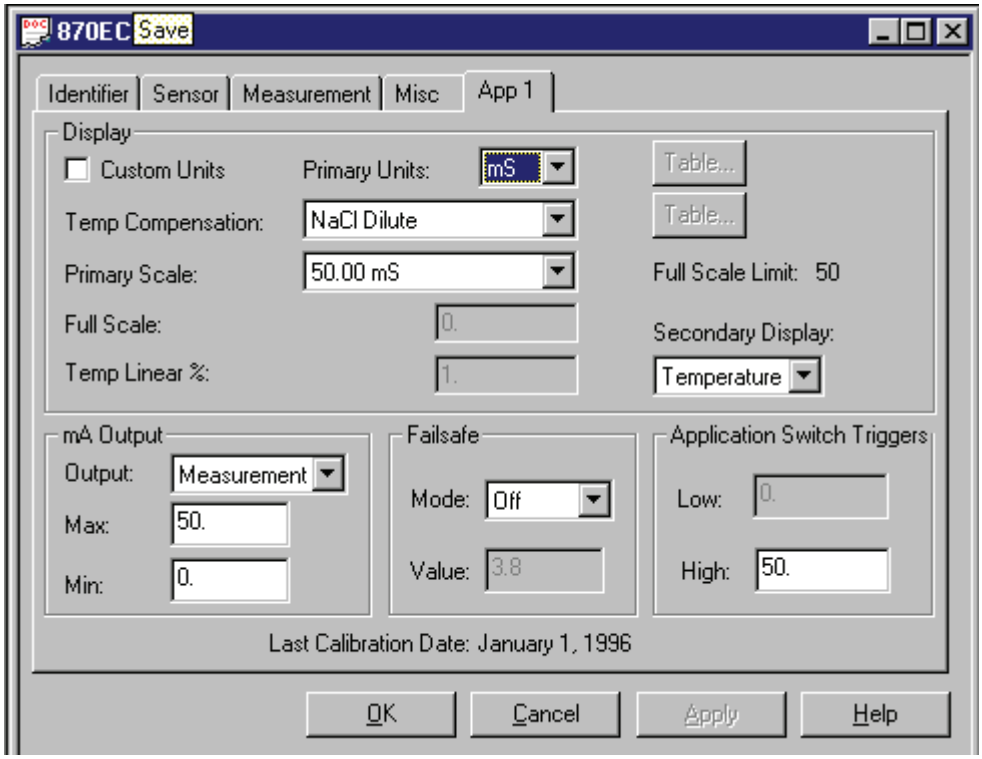


Figure I-12. Sample 870ITEC App1 Tab Screen

Field	Entry
Display	
Custom Units	√ = Custom; Blank = Not Custom
Primary Units	If not Custom, select **µS/cm**, **mS/cm**, or **%**. If Custom, select **%**, **g/l**, **ppm**, **oz/gal**, **ppt**, **S/m**, or **NONE**.
Temp Compensation	Select from menu of choices.
Primary Scale	Select from menu of choices.
Full Scale	Enter value up to full scale limit.
Temp Linear %	Enter value from 0 to 100,
Secondary Display	Select **Temp**, **Absolute**, or **mA**.
mA Output	
Output	If Analog Output Mode on sensor screen, specify **Absolute**, **Measurement**, or **Temperature**.
Max.	Enter 20 mA range value.

Field	Entry
Min.	Enter 4 mA range value.
Failsafe	
Mode	Specify **OFF**, **ON**, or **PULSE**
Value	If on, enter dc mA output between 3.8 and 20.5 mA.
Application Switch Triggers	Enter value of Low and High triggers.

Database Report

Table 36. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	2c	Reference Temp #3	25
Tag Number	FT102	Temp Size App #1	15
Tag Name	870ITEC	Temp Size App #2	15
Device Name	DevNam	Temp Size App #3	15
Geo Location	Office	Chem Units #1	00
Application Select	03	Chem Units #2	00
Probe	03	Chem Units #3	00
Cell Factor	2.15	Absolute Scale #1	02
Primary Units #1	02	Absolute Scale #2	02
Primary Units #2	00	Absolute Scale #3	02
Primary Units #3	01	Custom Chem Scale #1	02
Custom Units #1	00	Custom Chem Scale #2	02
Custom Units #2	00	Custom Chem Scale #3	02
Custom Units #3	00	Meas #1 Units	%
Primary Scale #1	10	Measurement Mapping	00 10 01 38
Primary Scale #2	0f	Output Range Max	1000
Primary Scale #3	04	Output Range Min	0
Prim Scale CMCP #1	13	TON Count (20 mA)	26600
Prim Scale CMCP #2	04	TON Count (4 mA)	5465
Prim Scale CMCP #3	04	Meas #2 Units	C
Prim Scale CMRG #1	95	Temp Units #1	00
Prim Scale CMRG #2	0	Temp Units #2	00
Prim Scale CMRG #3	20	Temp Units #3	00
Display Second #1	00	Chem Size Appl #1	15
Display Second #2	00	Chem Size Appl #2	15
Display Second #3	00	Chem Size Appl #3	15
Temp Comp TPCP #1	04	Temp Comp Temp 1 #1	0
Temp Comp TPCP #2	16	Temp Comp Val 1 #1	0
Temp Comp TPCP #3	04	Temp Comp Temp 2 #1	0
Temp Comp #1	1	Temp Comp Val 2 #1	0
Temp Comp #2	1	Temp Comp Temp 3 #1	0
Temp Comp #3	1	Temp Comp Val 3 #1	-0.22
Reference Temp #1	25	Temp Comp Temp 4 #1	0

Table 36. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Reference Temp #2	25	Temp Comp Val 4 #1	-0.22
Temp Comp Temp 5 #1	0	Temp Comp Val 2 #2	4
Temp Comp Val 5 #1	0.22	Temp Comp Temp 3 #2	0
Temp Comp Temp 6 #1	0	Temp Comp Val 3 #2	0
Temp Comp Val 6 #1	0.22	Temp Comp Temp 4 #2	0
Temp Comp Temp 7 #1	0	Temp Comp Val 4 #2	-99.99
Temp Comp Val 7 #1	0.22	Temp Comp Temp 5 #2	0
Temp Comp Temp 8 #1	0	Temp Comp Val 5 #2	-99.99
Temp Comp Val 8 #1	0.22	Temp Comp Temp 6 #2	0
Temp Comp Temp 9 #1	0	Temp Comp Val 6 #2	-99.99
Temp Comp Val 9 #1	-0.22	Temp Comp Temp 7 #2	0
Temp Comp Temp 10 #1	0	Temp Comp Val 7 #2	-99.99
Temp Comp Val 10 #1	-0.22	Temp Comp Temp 8 #2	0
Temp Comp Temp 11 #1	0	Temp Comp Val 8 #2	99.99
Temp Comp Val 11 #1	-0.22	Temp Comp Temp 9 #2	0
Temp Comp Temp 12 #1	0	Temp Comp Val 9 #2	99.99
Temp Comp Val 12 #1	-0.22	Temp Comp Temp 10 #2	0
Temp Comp Temp 13 #1	0	Temp Comp Val 10 #2	99.99
Temp Comp Val 13 #1	0.22	Temp Comp Temp 11 #2	0
Temp Comp Temp 14 #1	0	Temp Comp Val 11 #2	99.99
Temp Comp Val 14 #1	0.22	Temp Comp Temp 12 #2	0
Temp Comp Temp 15 #1	0	Temp Comp Val 12 #2	-99.99
Temp Comp Val 15 #1	0.22	Temp Comp Temp 13 #2	0
Temp Comp Temp 16 #1	0	Temp Comp Val 13 #2	-99.99
Temp Comp Val 16 #1	0.22	Temp Comp Temp 14 #2	0
Temp Comp Temp 17 #1	0	Temp Comp Val 14 #2	-99.99
Temp Comp Val 17 #1	-0.22	Temp Comp Temp 15 #2	0
Temp Comp Temp 18 #1	0	Temp Comp Val 15 #2	-99.99
Temp Comp Val 18 #1	-0.22	Temp Comp Temp 16 #2	0
Temp Comp Temp 19 #1	0	Temp Comp Val 16 #2	99.99
Temp Comp Val 19 #1	-0.22	Temp Comp Temp 17 #2	0
Temp Comp Temp 20 #1	0	Temp Comp Val 17 #2	99.99
Temp Comp Val 20 #1	-0.22	Temp Comp Temp 18 #2	0
Temp Comp Temp 21 #1	0	Temp Comp Val 18 #2	99.99
Temp Comp Val 21 #1	0.22	Temp Comp Temp 19 #2	0
Temp Comp Temp 1 #2	0	Temp Comp Val 19 #2	99.99
Temp Comp Val 1 #2	2	Temp Comp Temp 20 #2	0
Temp Comp Temp 2 #2	0	Temp Comp Val 20 #2	-99.99
Temp Comp Temp 21 #2	0	Temp Comp Temp 18 #3	0
Temp Comp Val 21 #2	-99.99	Temp Comp Val 18 #3	-0.22
Temp Comp Temp 1 #3	0	Temp Comp Temp 19 #3	0
Temp Comp Val 1 #3	0	Temp Comp Val 19 #3	0.22
Temp Comp Temp 2 #3	0	Temp Comp Temp 20 #3	0
Temp Comp Val 2 #3	0	Temp Comp Val 20 #3	0.22
Temp Comp Temp 3 #3	0	Temp Comp Temp 21 #3	0

Table 36. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Temp Comp Val 3 #3	0.22	Temp Comp Val 21 #3	0.22
Temp Comp Temp 4 #3	0	Chem Comp Temp 1 #1	0
Temp Comp Val 4 #3	0.22	Chem Comp Val 1 #1	0
Temp Comp Temp 5 #3	0	Chem Comp Temp 2 #1	0
Temp Comp Val 5 #3	0.22	Chem Comp Val 2 #1	0
Temp Comp Temp 6 #3	0	Chem Comp Temp 3 #1	0
Temp Comp Val 6 #3	0.22	Chem Comp Val 3 #1	0
Temp Comp Temp 7 #3	0	Chem Comp Temp 4 #1	0
Temp Comp Val 7 #3	-0.22	Chem Comp Val 4 #1	0
Temp Comp Temp 8 #3	0	Chem Comp Temp 5 #1	0
Temp Comp Val 8 #3	-0.22	Chem Comp Val 5 #1	0
Temp Comp Temp 9 #3	0	Chem Comp Temp 6 #1	0
Temp Comp Val 9 #3	-0.22	Chem Comp Val 6 #1	0
Temp Comp Temp 10 #3	0	Chem Comp Temp 7 #1	0
Temp Comp Val 10 #3	-0.22	Chem Comp Val 7 #1	0
Temp Comp Temp 11 #3	0	Chem Comp Temp 8 #1	0
Temp Comp Val 11 #3	89041.48	Chem Comp Val 8 #1	0
Custom Table X/Y R/W	15969	Chem Comp Temp 9 #1	0
Temp Comp Temp 12 #3	0	Chem Comp Val 9 #1	0
Temp Comp Val 12 #3	0.22	Chem Comp Temp 10 #1	0
Temp Comp Temp 13 #3	0	Chem Comp Val 10 #1	0
Temp Comp Val 13 #3	0.22	Chem Comp Temp 11 #1	0
Temp Comp Temp 14 #3	0	Chem Comp Val 11 #1	0
Temp Comp Val 14 #3	0.22	Chem Comp Temp 12 #1	0
Temp Comp Temp 15 #3	0	Chem Comp Val 12 #1	0
Temp Comp Val 15 #3	-0.22	Chem Comp Temp 13 #1	0
Temp Comp Temp 16 #3	0	Chem Comp Val 13 #1	0
Temp Comp Val 16 #3	-0.22	Chem Comp Temp 14 #1	0
Temp Comp Temp 17 #3	0	Chem Comp Val 14 #1	0
Temp Comp Val 17 #3	-0.22	Chem Comp Temp 15 #1	0
Chem Comp Val 15 #1	0	Chem Comp Temp 13 #2	0
Chem Comp Temp 16 #1	0	Chem Comp Val 13 #2	0
Chem Comp Val 16 #1	0	Chem Comp Temp 14 #2	0
Chem Comp Temp 17 #1	0	Chem Comp Val 14 #2	0
Chem Comp Val 17 #1	0	Chem Comp Temp 15 #2	0
Chem Comp Temp 18 #1	0	Chem Comp Val 15 #2	0
Chem Comp Val 18 #1	0	Chem Comp Temp 16 #2	0
Chem Comp Temp 19 #1	0	Chem Comp Val 16 #2	0
Chem Comp Val 19 #1	0	Chem Comp Temp 17 #2	0
Chem Comp Temp 20 #1	0	Chem Comp Val 17 #2	0
Chem Comp Val 20 #1	0	Chem Comp Temp 18 #2	0
Chem Comp Temp 21 #1	0	Chem Comp Val 18 #2	0
Chem Comp Val 21 #1	0	Chem Comp Temp 19 #2	0
Chem Comp Temp 1 #2	0	Chem Comp Val 19 #2	0
Chem Comp Val 1 #2	0	Chem Comp Temp 20 #2	0

Table 36. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Chem Comp Temp 2 #2	0	Chem Comp Val 20 #2	0
Chem Comp Val 2 #2	0	Chem Comp Temp 21 #2	0
Chem Comp Temp 3 #2	0	Chem Comp Val 21 #2	0
Chem Comp Val 3 #2	0	Chem Comp Temp 1 #3	0
Chem Comp Temp 4 #2	0	Chem Comp Val 1 #3	0
Chem Comp Val 4 #2	0	Chem Comp Temp 2 #3	0
Chem Comp Temp 5 #2	0	Chem Comp Val 2 #3	0
Chem Comp Val 5 #2	0	Chem Comp Temp 3 #3	0
Chem Comp Temp 6 #2	0	Chem Comp Val 3 #3	0
Chem Comp Val 6 #2	0	Chem Comp Temp 4 #3	0
Chem Comp Temp 7 #2	0	Chem Comp Val 4 #3	0
Chem Comp Val 7 #2	0	Chem Comp Temp 5 #3	0
Chem Comp Temp 8 #2	0	Chem Comp Val 5 #3	0
Chem Comp Val 8 #2	0	Chem Comp Temp 6 #3	0
Chem Comp Temp 9 #2	0	Chem Comp Val 6 #3	0
Chem Comp Val 9 #2	0	Chem Comp Temp 7 #3	0
Chem Comp Temp 10 #2	0	Chem Comp Val 7 #3	0
Chem Comp Val 10 #2	0	Chem Comp Temp 8 #3	0
Chem Comp Temp 11 #2	0	Chem Comp Val 8 #3	0
Chem Comp Val 11 #2	0	Chem Comp Temp 9 #3	0
Chem Comp Temp 12 #2	0	Chem Comp Val 9 #3	0
Chem Comp Val 12 #2	0	Chem Comp Temp 10 #3	0
Chem Comp Val 10 #3	0	Output mA #3	-0.0125
Chem Comp Temp 11 #3	0	Temperature Units	00
Chem Comp Val 11 #3	0	Temperature Mode	00
Chem Comp Temp 12 #3	0	Temp Auto Mode	10
Chem Comp Val 12 #3	0	Temp Manual Mode	25
Chem Comp Temp 13 #3	0	Temp Type	04
Chem Comp Val 13 #3	0	Damp	02
Chem Comp Temp 14 #3	0	Meas Stability	01
Chem Comp Val 14 #3	0	Meas Stability Time	05
Chem Comp Temp 15 #3	0	Meas Stability Var	01
Chem Comp Val 15 #3	0	Temp Stability	00
Chem Comp Temp 16 #3	0	Temp Stability Time	00
Chem Comp Val 16 #3	0	Temp Stability Var	09
Chem Comp Temp 17 #3	0	Timeout	600
Chem Comp Val 17 #3	0	Minor Passcode	800
Chem Comp Temp 18 #3	0	Major Passcode	800
Chem Comp Val 18 #3	0	Number Applications	02
Chem Comp Temp 19 #3	0	Trigger: #1 High	99
Chem Comp Val 19 #3	0	Trigger: #2 Low	0
Chem Comp Temp 20 #3	0	Trigger: #2 High	1000
Chem Comp Val 20 #3	0	Trigger: #3 Low	0
Chem Comp Temp 21 #3	0	Hold Configuration	80
Chem Comp Val 21 #3	0	mA Hold Value	0.3749999

Table 36. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Analog Output #1	01	Meas 1 Hold Value	200
Analog Output #2	01	Temp Hold Value	0
Analog Output #3	01	Absolute Hold Value	999
Lower Range Value #1	90	Cal Name (App 1):	GTF
Lower Range Value #2	0	Cal Name (App 2):	STD
Lower Range Value #3	0	Cal Name (App 3):	GTF
Upper Range Value #1	99	Cal Date: #1	4/16/98
Upper Range Value #2	25	Cal Date: #2	12/4/97
Upper Range Value #3	25	Cal Date: #3	4/16/98
Output Failsafe #1	00	Sales Order Number	95F0000000010001
Output Failsafe #2	00	MS Code	870ITEC
Output Failsafe #3	00	Software Version	53 56 4e 5f
Output mA #1	-0.0125	Low Meas Cal #1	0
Output mA #2	-0.0125	Low Meas Cal #2	10
Low Meas Cal #3	25	K Ref Resistance	1958.983
High Meas Cal #1	95	TCAL1	25
High Meas Cal #2	25	Thermistor Cal (#1)	100722
High Meas Cal #3	35	Thermistor Cal (#2)	524277.8
Kernal Major Rev #	00	Trigger: #1 Low	-1e+010
Kernal Minor Rev #	04	Trigger: #3 High	1e+010
SREVMJ	01	REV_INFO	be
SREVMN	14	IGN2	8/16/02
Display Major Rev #	00	Sensor Minor Rev #	14
Display Minor Rev #	00	Sensor Major Rev #	01
Parameter Tbl Offset	c9 3b	IGN3	4
Parameter Table CRC	bf 0e	IGN4	150
Parameter Table Type	00	IGN5	ff
Parameter Table Size 00	ff		
Reserved	00 00 00		
Calibration Req'd	06		
Core Manufact. Date	1/1/94		
Output Mode	01		
Enable/Disable Diag	c3 f0 f0 c3		
Clear Diagnostics	00 00 00 00		
Low Cal Point KCL 1	143.8768		
Low Cal Point KCL 2	10		
Low Cal Point KCL 3	3		
High Cal Point KCH 1	0		
High Cal Point KCH 2	2 -614450.4		
High Cal Point KCH 3	3 -1335957		
Low Cal Point VCL 1	-0.002598027		
Low Cal Point VCL 2	-0.00291353		
Low Cal Point VCL 3	-0.002883723		
Temperature Offset	215		
User In	0		

Table 36. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Drive 0 Amp Offset	1521		
Drive 90 Amp Offset	175		
Meas 0 Amp Offset	-767		
Meas 90 Amp Offset	-632		
Freq Conv Factor	500000		
Ohm Ref Res	138.5662		

Appendix J. 870ITPH pH/ORP/ISE Transmitters

This appendix provides information that is exclusive to the 870ITPH Transmitters in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

Device Data Screen

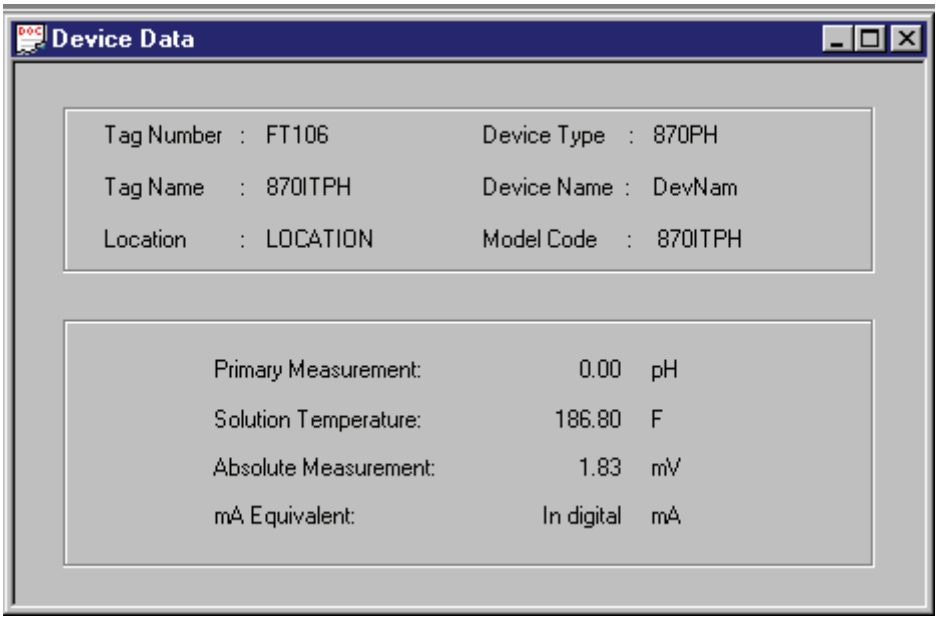


Figure J-1. Sample 870ITPH Device Data Screen

Error Messages

Table 37. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is re-initializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Measurement Error	Unstable process measurement.	Check sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Stability Error	Raw measurement has been unstable.	Check wiring. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Probe Error	Indicates an error with the probe.	If Coat error, clean probe. If Lowslope error, replace buffer solution (if contaminated). For other problems, replace probe.
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Amplifier Error	Out of range error.	Check probe. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Extended Status - Hardware		
ATC Open	Resistance of temperature compensation is less than expected resistance of device configured.	Replace temperature compensator.
ATC Short	Resistance of temperature compensation is greater than expected resistance of device configured.	Replace temperature compensator.
Coat Error	Reference junction resistance in relation to solution ground is less than user set limit.	Clean electrode.

Table 37. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
Glass Res Error	Resistance of glass electrode in relation to solution ground is less than user set limit.	Replace electrode.
Aging Error	Aging glass electrode.	Check value of slope. See *870ITPH pH/ISE/ORP Transmitters* (MI 611-211).
Leak Error	Resistance between solution ground and the RTD is greater than infinite.	Replace sensor.
Amp Failure	Out of range error.	Check sensor. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Slope Error	Nernst slope of sensor is less than user set limit.	Replace electrode or solution.
Cal Slope Error	A slope error has occurred as the result of the previous calibration.	Check sensor and recalibrate transmitter. If the problem persists, contact the CSC.
Extended Status - Process		
mA Under Range	Measurement outside configured range.	Reconfigure range or correct process error.
mA Over Range		
Cal Required	Calibration required.	Calibrate.
Comp Under Range	Measurement outside compensation curve.	Reconfigure compensation or correct process error.
Comp Over Range		
No A2D Interrupts		
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Disp Under Range	Primary measurement is too low or too high.	Check sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Disp over Range		
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact the CSC.
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact the CSC.

Table 37. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact the CSC.

Calibration

You can perform the following calibration procedures on an 870ITPH transmitter using the Intelligent Field Device Configurators:

- 1-Point Manual Calibration
- 2-Point Manual Calibration
- Automatic Calibration
- Temperature Sensor
- mA Calibration.

1-Point Manual Calibration

This option permits you to set a calibration point (1-point offset), using a known reference solution (buffer).

1. Select **1-Point Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.

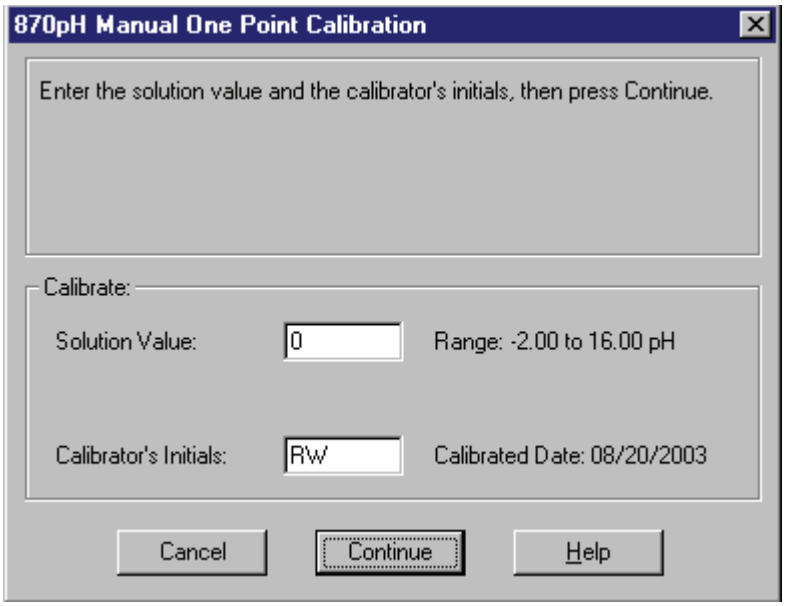


Figure J-2. Sample 870ITPH 1-Point Manual Calibration Screen

3. Enter the solution value and the calibrator's initials and select **Continue**.
4. Immerse the sensor in the solution and select **Continue**.

5. Wait while the device is calibrating. The current calibration date is automatically updated.
6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

2-Point Manual Calibration

This option permits you to set span and offset, using two known reference solutions (buffers).

1. Select **2-Point Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.

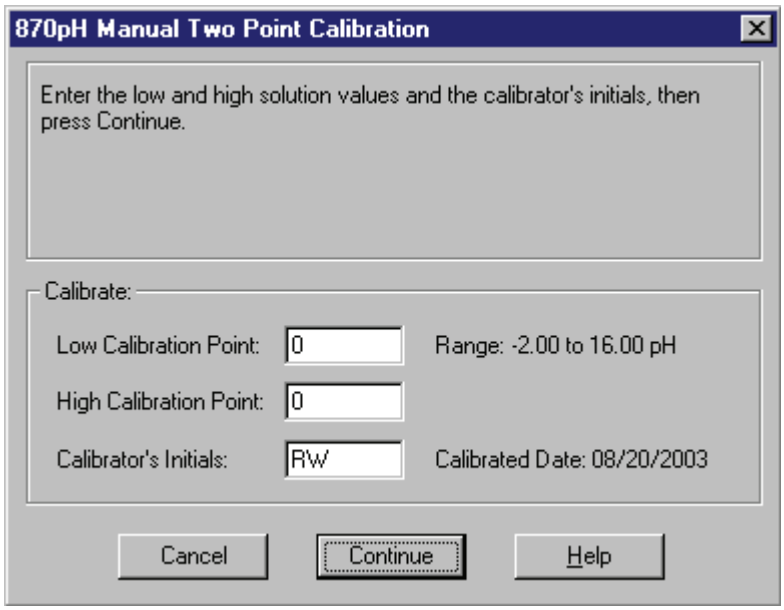


Figure J-3. Sample 870ITPH 2-Point Manual Calibration Screen

3. Enter the high and low solution values and the calibrator's initials and select **Continue**.
4. Immerse the sensor in the low solution and select **Continue**.
5. Wait while the device is calibrating.
6. Immerse the sensor in the high solution and select **Continue**.
7. Wait while the device is calibrating. The current calibration date is automatically updated.
8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Automatic Calibration

This option provides a buffer-recognition mechanism that locks in the buffer value representing millivolts and temperature being reported from the sensor, using known reference solutions. The algorithm checks each buffer starting with Buffer 1 and selects the first one for which this pH is

within 0.5 pH of the average pH for the buffer. If not within 0.5 pH of any buffer table, no buffer is selected.

1. Select **Automatic Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter the calibrator's initials and select **Continue**.
4. Immerse the sensor in the low solution and select **Continue**.
5. Wait while the device is calibrating.
6. Immerse the sensor in the high solution and select **Continue**.
7. Wait while the device is calibrating. The current calibration date is automatically updated.
8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

1. Select **Temperature Sensor** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.

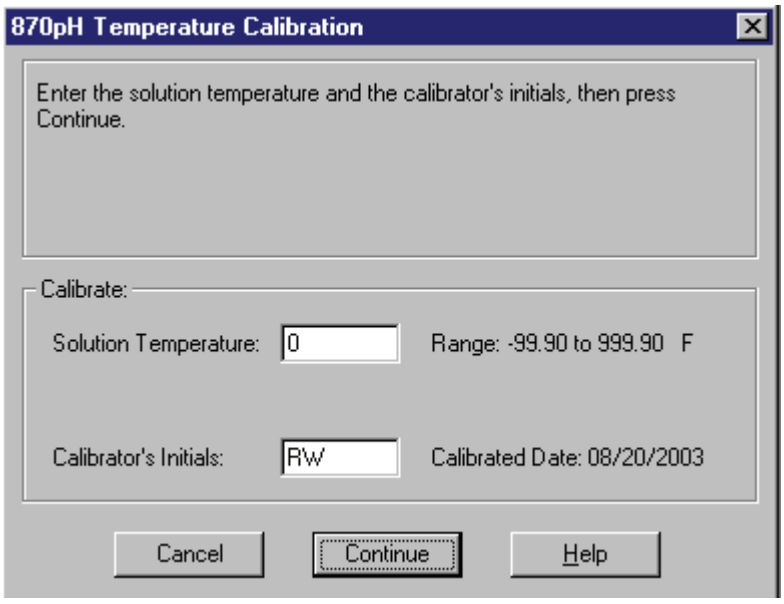


Figure J-4. Sample 870ITPH Temperature Calibration Screen

3. Enter the solution temperature and the calibrator's initials and select **Continue**.
4. Immerse the sensor in the solution and select **Continue**.

5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. This procedure should only be performed if the mA value displayed on the Device Data screen does not agree with the value measured by an accurate mA meter installed in the loop wiring.

The procedure to perform a mA Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

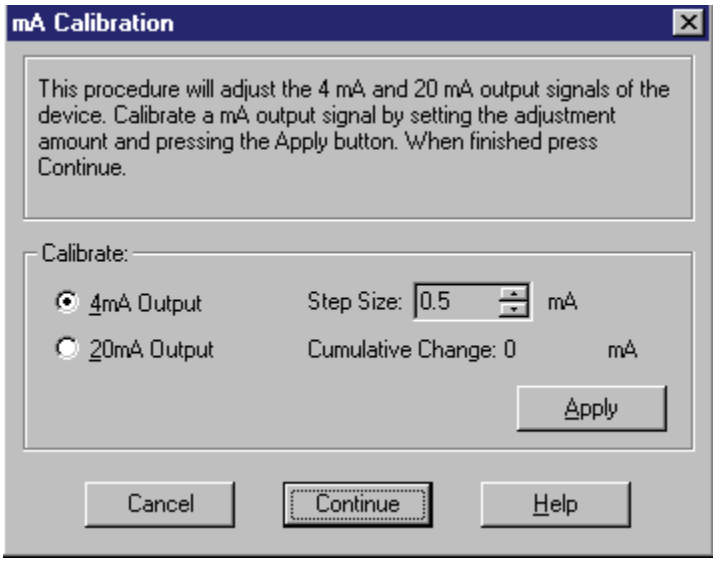

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure J-5. Sample 870ITPH mA Calibration Screen

5. Set the **Step Size** from the menu (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown in the screen.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Configuration

Identifier Tab Screen

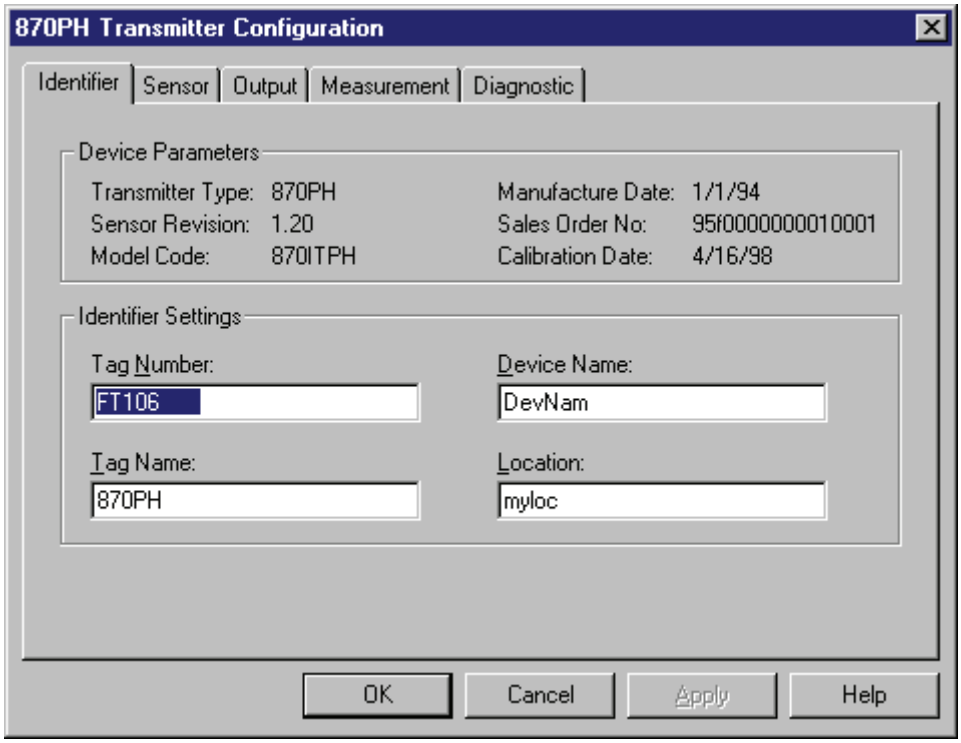


Figure J-6. Sample 870ITPH Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

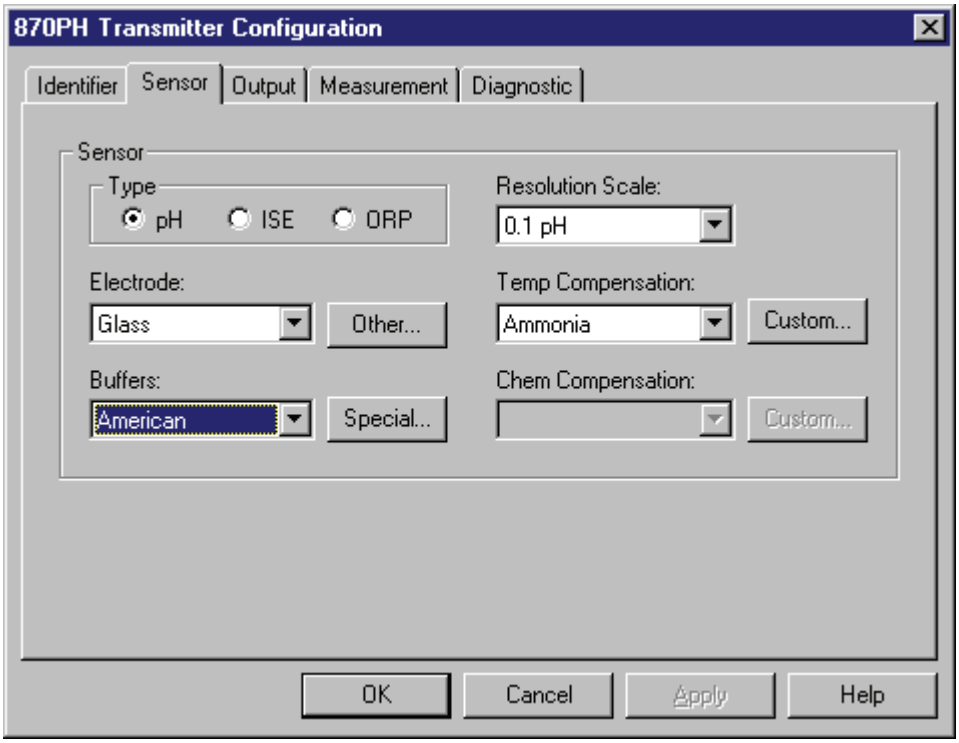


Figure J-7. Sample 870ITPH Sensor Tab Screen

Field	Entry
Sensor	
Type	Select **pH**, **ISE**, or **ORP**.
Electrode	If pH, select **Glass**, **Antimony**, or **Other**. If ISE, select **Positive** or **Negative**.
Buffers	If pH, select **American**, **NIST**, **European**, or **Special** (see Figure J-8).
Resolution Scale	If pH, select **0.1 pH** or **0.01 pH**.
Temp. Compensation	If pH, select **Standard**, **Ammonia**, or **Custom** (see Figure J-9). If ISE, select **Standard** or **Custom**.
Chem. Compensation	If ISE, select **Standard** or **Custom** (see Figure J-10).

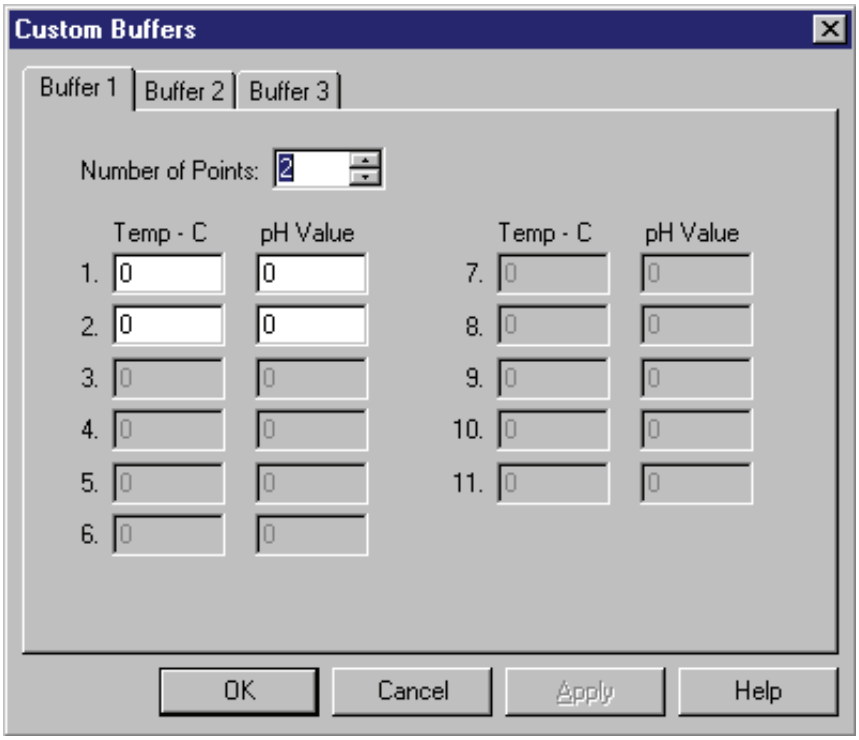


Figure J-8. Custom Buffers Screen

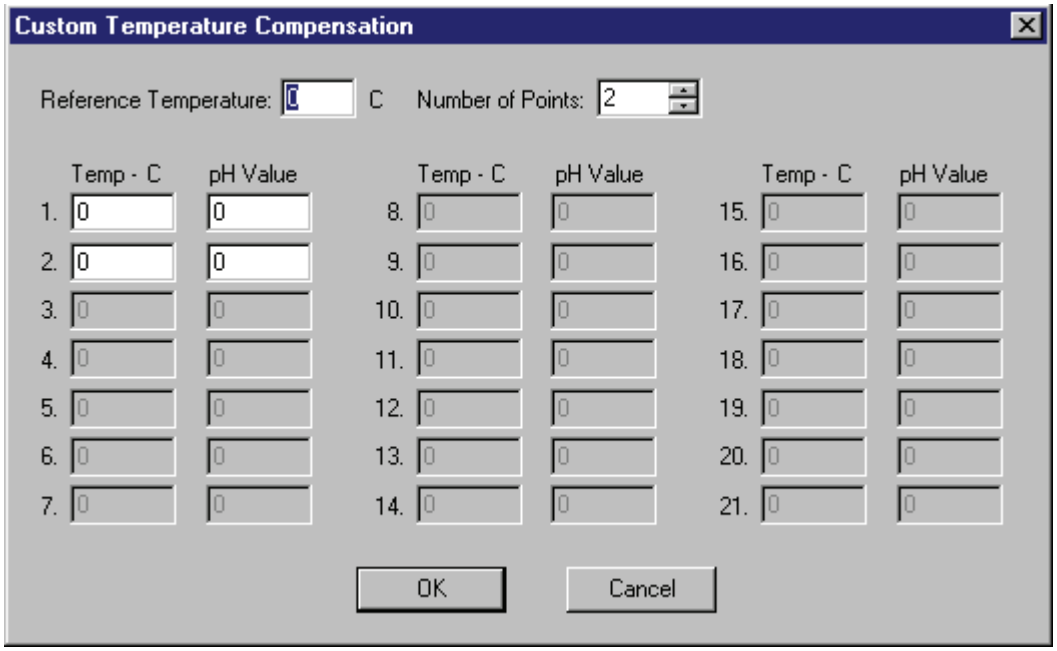


Figure J-9. Custom Temperature Compensation Screen

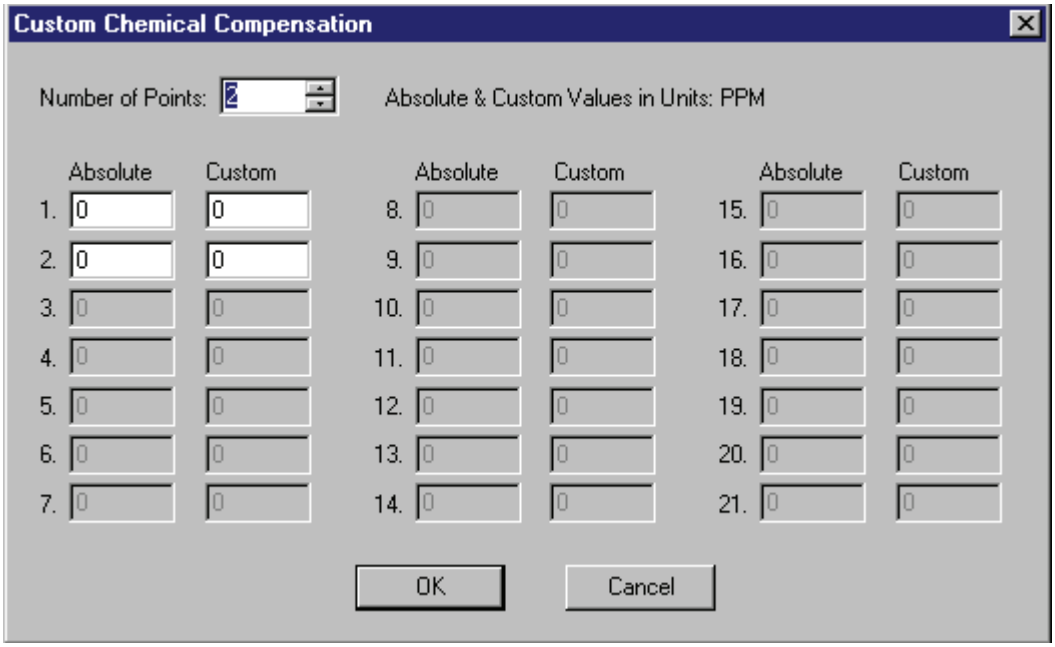


Figure J-10. Custom Chemical Compensation Screen

Output Tab Screen

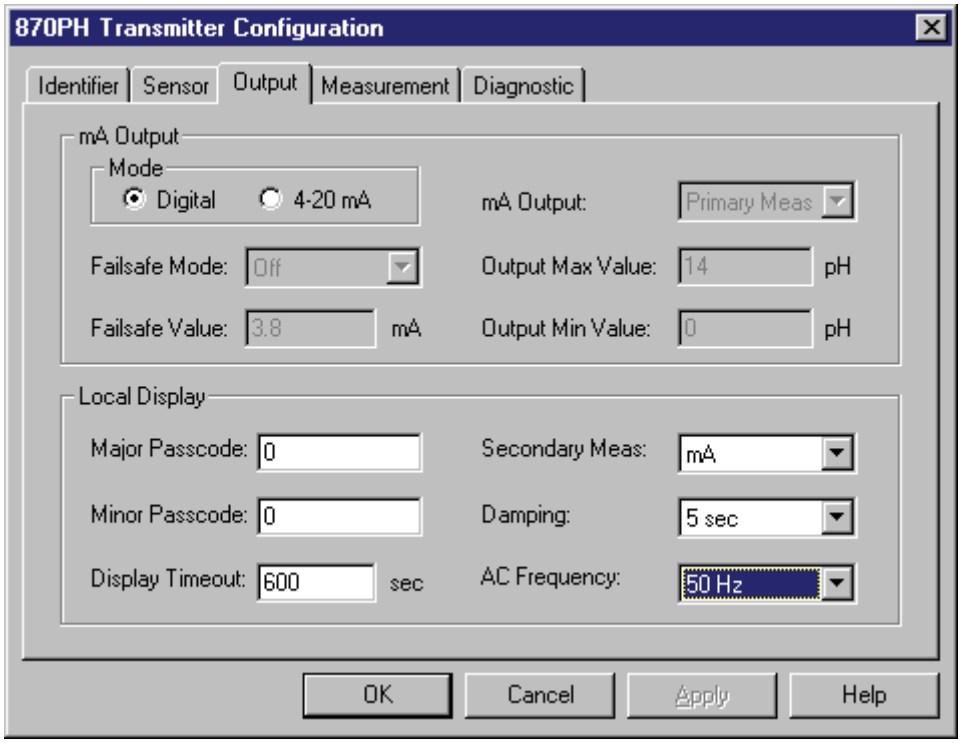


Figure J-11. Sample 870ITPH Output Tab Screen

Field	Entry
mA Output	
Mode	Select **Digital** or **4-20 mA**.
Failsafe Mode	If 4-20 mA Mode, specify **OFF**, **ON**, or **PULSE**.
Failsafe Value	If ON, enter dc mA output between 3.8 and 20.5 mA.
mA Output	If 4-20 mA Mode, specify **Absolute**, **Measurement**, or **Temperature**.
Output Max Value	If 4-20 mA Mode, enter 20 mA range value.
Output Min Value	If 4-20 mA Mode, enter 4 mA range value.
Local Display	
Major Passcode	Enter 4-digit passcode.
Minor Passcode	Enter 4-digit passcode.
Display Timeout	Enter timeout between 0 and 999 seconds.
Secondary Meas	Select **Temperature**, **Absolute**, or **mA**.
Damping	Select damping response time of **1**, **5**, **10**, **20**, **40**, or **120 seconds**.
AC Frequency	Select **50** or **60 Hz**.

Measurement Tab Screen

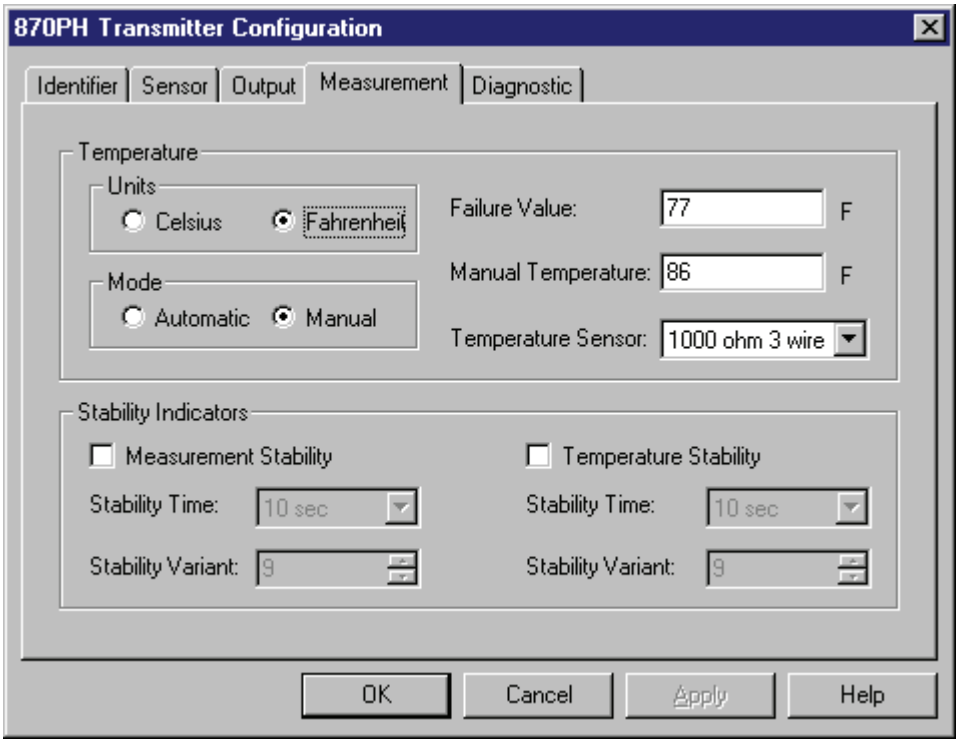


Figure J-12. Sample 870ITPH Measurement Tab Screen

Field	Entry
Temperature	
Units	Select **Celsius** or **Fahrenheit**.
Mode	Select **Automatic** or **Manual**.
Failure Value	If Mode is Automatic, enter temperature in case RTD fails.
Manual Temperature	If Mode is Manual, enter temperature.
Temperature Sensor	Select **2-wire 100 Ω**, **2-wire 1000 Ω**, **3-wire 100 Ω**, **3-wire 1000 Ω**, or **Balco 3K**.
Stability Indicators	
Measurement Stability	√ = Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.
Temperature Stability	√ = Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.

Diagnostic Tab Screen

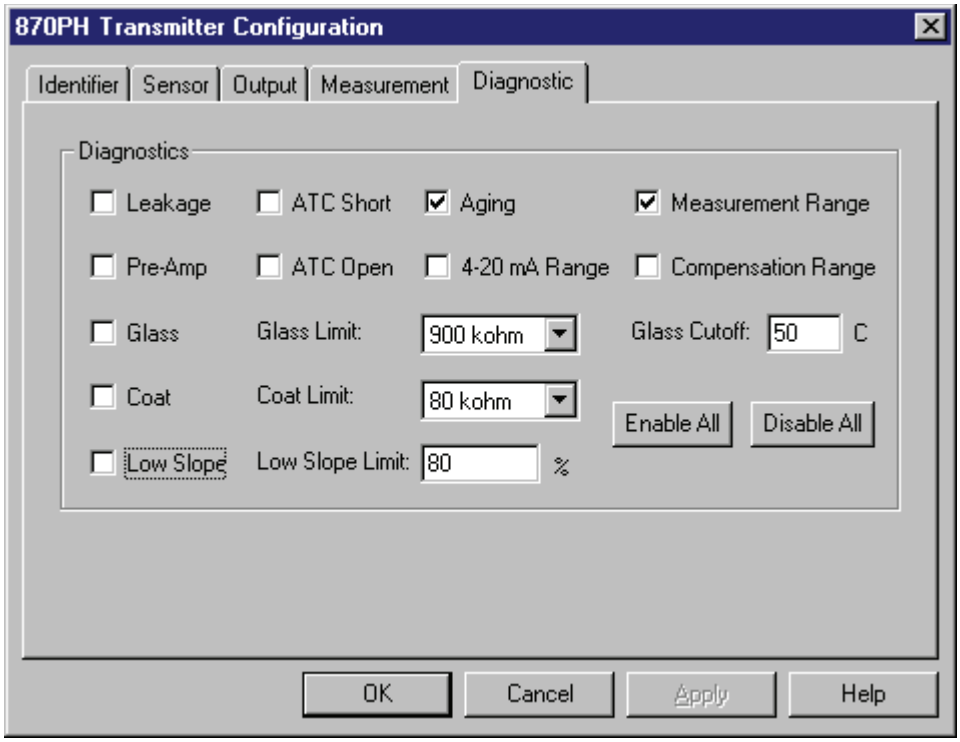


Figure J-13. Sample 870ITPH Diagnostic Tab Screen

Field	Entry
Diagnostics	
Leakage	√ = Enable error messages; Blank = Disable error messages
Pre-Amp	
Glass	
Coat	
Low Slope	
ATC Short	
ATC Open	
Aging	
4-20 mA Range	
Measurement Range	
Compensation Range	
Enable All	Enables all messages listed above.
Disable All	Disables all messages listed above.
Glass Limit	Select from menu of values between 0 and 1100 kΩ
Glass Cutoff	Enter value between 0 and 100 degrees.
Coat Limit	Select from menu of values between 0 and 100 kΩ
Low Slope Limit	Enter value between 0 and 100%.

Database Report

Table 38. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	2b	pH Cal Point ASYMM	-0.1040039
Tag Number	FT106	History Slope 1	0
Tag Name	870ITPH	History Slope 2	0
Device Name	DevNam	History Slope 3	0
Geo Location	myloc	History Slope 4	0
Model Code	870ITPH	History Slope 5	0
Sales Order Number	95f0000000010001	Temperature Offset	234.3723
Software Version	ÿÿÿÿÿÿÿÿ	Low mV Cal Point	-421724
Calibrator's Initial	GTF	High mV Cal Point	0.004747301
Calibration Date	4/16/98	Temp 100 Ohm Cal	138.6425
Sensor Type	00	Temp not 100 Ohm Cal	1959.046
Resolution/Scale	00	Glass Low Calib Pt	0
Meas #2 Display	02	Glass High Calib Pt	0
mA Output	01	Ref Low Calib Pt	2.657
Output Range Max	14	Ref High Calib Pt	25
Output Range Min	0	TON Count (20 mA)	26526
Failsafe Mode	00	TON Count (4 mA)	5310
Failsafe Value	-0.0125	Meas #1 Units	pH
Electrode	00	Meas #2 Units	F
Temp. Compensation	02	User In	0
Temp Decimal Point	00	Number Temp Points	02
Reference Temp	25	Temp Compens Temp 1	0
Temperature Units	01	Temp Compens Val 1	226.92
Temperature Mode	01	Temp Compens Temp 2	0
Temp Failure Value	77	Temp Compens Val 2	226.92
Manual Temperature	86	Temp Compens Temp 3	0
Temp Sensor Type	03	Temp Compens Val 3	226.92
Damping	02	Temp Compens Temp 4	0
Chemical Compens.	01	Temp Compens Val 4	25.5
Chem Decimal Point	00	Temp Compens Temp 5	0
Meas Stability	00	Temp Compens Val 5	-227
Meas Stable Time	0a	Temp Compens Temp 6	0
Meas Stable Var	09	Temp Compens Val 6	-227
Temp Stability	00	Temp Compens Temp 7	0
Temp Stable Time	0a	Temp Compens Val 7	-227
Temp Stable Var	09	Temp Compens Temp 8	0
ISO Value	7	Temp Compens Val 8	-227
Display Time Out	600	Temp Compens Temp 9	0
Buffers	00	Temp Compens Val 9	226.92
Major Passcode	0	Temp Compens Temp 10	0
Minor Passcode	0	Temp Compens Val 10	226.92
AC Frequency	32	Temp Compens Temp 11	0
Coat Limit	08	Temp Compens Val 11	226.92

Table 38. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Glass Limit	09	Temp Compens Temp 12	0
Glass CutOff Temp	50	Temp Compens Val 12	226.92
Low Slope Limit	80	Temp Compens Temp 13	0
Hold Configuration	01	Temp Compens Val 13	-227
mA Hold Value	0.4375	Temp Compens Temp 14	0
Meas 1 Hold Value	-1	Temp Compens Val 14	-227
Temp Hold Value	77	Temp Compens Temp 15	0
Absolute Hold Value	77	Temp Compens Val 15	-227
Enable/Disable Diag	84 f0 ff 7f	Temp Compens Temp 16	0
Clear Diagnostics	00 00 00 00	Temp Compens Val 16	-227
Core Number	00 00	Temp Compens Temp 17	0
Core Manufact. Date	1/1/94	Temp Compens Val 17	226.92
Output Mode	00	Temp Compens Temp 18	0
Glass Resistance	0	Temp Compens Val 18	226.92
Reference Resistance	0	Temp Compens Temp 19	0
Low Cal Point MCL	6.972867	Temp Compens Val 19	226.92
High Cal Point MCH	6.972867	Temp Compens Temp 20	0
Low Cal Point KCL	-9.744641	Temp Compens Val 20	226.92
Low Cal Point VCL	-46	Temp Compens Temp 21	0
High Cal Point KCH	-0.02389015	Temp Compens Val 21	-227
ISE Low Cal Pt MVMCL	0	Number Chem Points	02
ISE Hi Cal Pt KPPM	1000	Chem Compens Abs 1	0
Chem Compens New 1	226.92	Buffer 2 Temp 1	0
Chem Compens Abs 2	0	Buffer 2 Val 1	-219.29
Chem Compens New 2	226.92	Buffer 2 Temp 2	0
Chem Compens Abs 3	0	Buffer 2 Val 2	219.3
Chem Compens New 3	-227	Buffer 2 Temp 3	0
Chem Compens Abs 4	0	Buffer 2 Val 3	219.3
Chem Compens New 4	-227	Buffer 2 Temp 4	0
Chem Compens Abs 5	0	Buffer 2 Val 4	219.3
Chem Compens New 5	-227	Buffer 2 Temp 5	0
Chem Compens Abs 6	0	Buffer 2 Val 5	219.3
Chem Compens New 6	-227	Buffer 2 Temp 6	0
Chem Compens Abs 7	0	Buffer 2 Val 6	-219.29
Chem Compens New 7	226.92	Buffer 2 Temp 7	0
Chem Compens Abs 8	0	Buffer 2 Val 7	-219.29
Chem Compens New 8	226.92	Buffer 2 Temp 8	0
Chem Compens Abs 9	0	Buffer 2 Val 8	-219.29
Chem Compens New 9	226.92	Buffer 2 Temp 9	0
Chem Compens Abs 10	0	Buffer 2 Val 9	-219.29
Chem Compens New 10	226.92	Buffer 2 Temp 10	0
Chem Compens Abs 11	0	Buffer 2 Val 10	219.3
Chem Compens New 11	-227	Buffer 2 Temp 11	0
Chem Compens Abs 12	0	Buffer 2 Val 11	219.3
Chem Compens New 12	-227	Buffer 3 Size	01

Table 38. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Chem Compens Abs 13	0	Buffer 3 Temp 1	0
Chem Compens New 13	-227	Buffer 3 Val 1	219.3
Chem Compens Abs 14	0	Buffer 3 Temp 2	0
Chem Compens New 14	-227	Buffer 3 Val 2	219.3
Chem Compens Abs 15	0	Buffer 3 Temp 3	0
Chem Compens New 15	226.92	Buffer 3 Val 3	-219.29
Chem Compens Abs 16	0	Buffer 3 Temp 4	0
Chem Compens New 16	226.92	Buffer 3 Val 4	-219.29
Chem Compens Abs 17	0	Buffer 3 Temp 5	0
Chem Compens New 17	226.92	Buffer 3 Val 5	-219.29
Chem Compens Abs 18	0	Buffer 3 Temp 6	0
Chem Compens New 18	226.92	Buffer 3 Val 6	-219.29
Chem Compens Abs 19	0	Buffer 3 Temp 7	0
Chem Compens New 19	-227	Buffer 3 Val 7	219.3
Chem Compens Abs 20	0	Buffer 3 Temp 8	0
Chem Compens New 20	-227	Buffer 3 Val 8	219.3
Chem Compens Abs 21	0	Buffer 3 Temp 9	0
Chem Compens New 21	-227	Buffer 3 Val 9	219.3
Buffer 1 Size	02	Buffer 3 Temp 10	0
Buffer 1 Temp 1	0	Buffer 3 Val 10	219.3
Buffer 1 Val 1	-219.29	Buffer 3 Temp 11	0
Buffer 1 Temp 2	0	Buffer 3 Val 11	-219.29
Buffer 1 Val 2	-219.29	Measurement Mapping	01 01 02 03
Buffer 1 Temp 3	0	Database Change Flag	72
Buffer 1 Val 3	-219.29	Kernal Major Rev #	00
Buffer 1 Temp 4	0	Kernal Minor Rev #	04
Buffer 1 Val 4	-219.29	SREVMAJ	01
Buffer 1 Temp 5	0	SREVMIN	01
Buffer 1 Val 5	219.3	Display Major Rev #	00
Buffer 1 Temp 6	0	Display Minor Rev #	00
Buffer 1 Val 6	219.3	Parameter Tbl Offset	c9
Buffer 1 Temp 7	0	Parameter Table CRC	1f dd
Buffer 1 Val 7	219.3	Parameter Table Type	00
Buffer 1 Temp 8	0	Parameter Table Size	00 dd
Buffer 1 Val 8	219.3	Reserved	00 00 00
Buffer 1 Temp 9	0	Calibration Req'd	00
Buffer 1 Val 9	-219.29	Drive 0 Amp Offset	0
Buffer 1 Temp 10	0	Custom Table X/Y	Rd/ 60093
Buffer 1 Val 10	-219.29	Meas 0 Amp Offset	0
Buffer 1 Temp 11	0	Meas 90 Amp Offset	0
Buffer 1 Val 11	-219.29	Eng Units Name	pH F
Buffer 2 Size	02	Freq Conv Factor	500000
mA Correction #1	2		
mA Correction #2	2		
mA Correction #3	2		

Table 38. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
CMCL	0		
CMCH	0		
REV_INFO	be		
IGN2	8/16/02		
Sensor Minor Rev #	14		
Sensor Major Rev #	01		
IGN3	4		
IGN4	150		
IGN5	dd		

Appendix K. Intelligent Positioners (SRD991, SRD960, and Others)

This appendix provides information that is exclusive to the Intelligent Positioners (SRD991, SRD960, and so forth) in regards to the Intelligent Field Device Configurators. See the list of all supported Intelligent Positioners (all different models and protocols) in Table 2. The configurations of the different Intelligent Positioner models are very similar to each other. The following description shows the configuration of the Intelligent Positioners using the SRD991 as an example. If there are differences between the models and protocols it will be outlined in the description.

This appendix contains information on:

- Device Data Screen
- Status Error Messages
- Calibration
- Configuration
- Database Report

For additional information, refer to on-line Help and MI EVE0105.

Device Data Screen

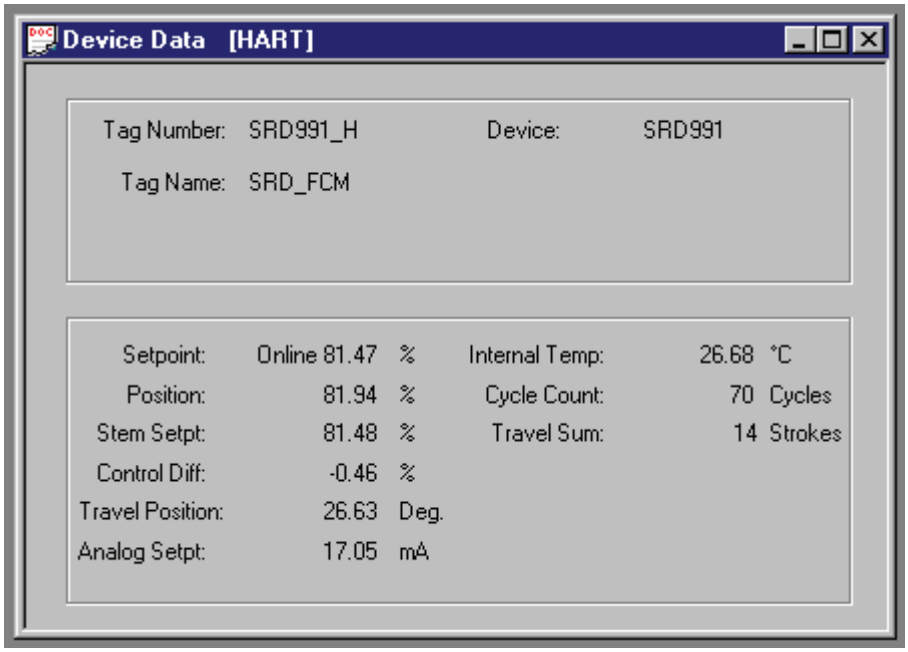


Figure K-1. Sample SRD991 Device Data Screen

Additional Profibus Data Screen

For Profibus devices, an additional Data screen may be opened to display additional Profibus specific parameters. For viewing the Profibus data, select **View > Profibus Data**. This function opens a modeless dialog box. The displayed information is updated approximately once every two seconds.

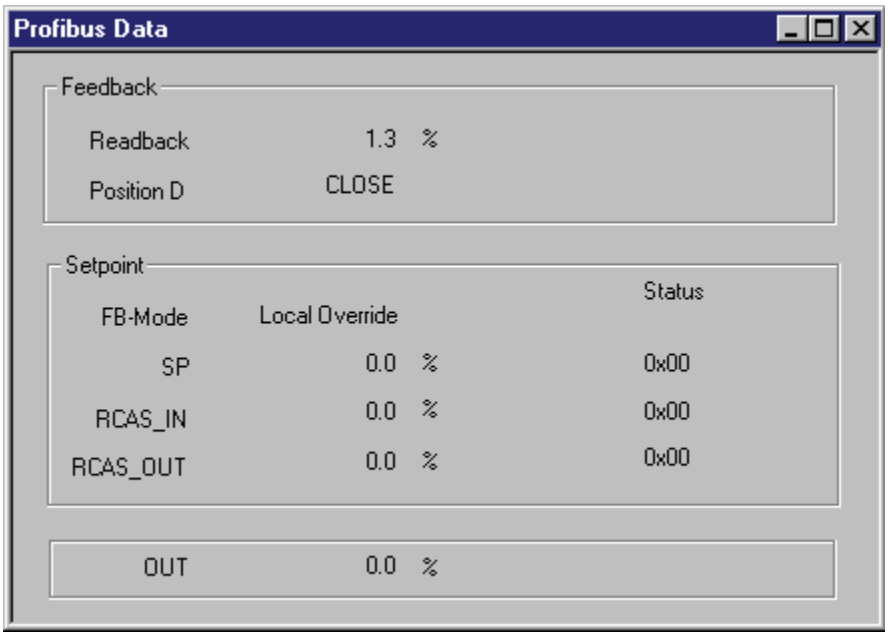


Figure K-2. Standard Profibus Data Screen

Fields	Description
Readback	The actual position of the actuator/valve within the travel span in units of PV-SCALE.
Position D	The current position of the actuator/valve (discrete). Possible values are: NOT INITIALIZED (before an autostart has been performed), CLOSED, OPENED and INTERMEDIATE.
FB-Mode	Actual Mode of the Function Block.
SP	Setpoint SP in units of PV-SCALE. This setpoint is used as desired value, when the function block is in Mode AUTO and the status of SP is OK (for example, Good (Non Cascade) = 0x80).

Fields	Description
RCAS_IN	Setpoint RCAS_IN in units of PV-SCALE. This setpoint is normally transmitted by a DCS-system. This setpoint is used as desired value, when the function block is in Mode RCAS and the status of RCAS_IN is OK [for example, Good (Cascade) = 0xC0].
RCAS_OUT	Setpoint RCAS_OUT in units of PV-SCALE with status, which is used as input for the function block algorithm. Depending on the mode of the function block contains the setpoint SP or RCAS_IN. RCAS_OUT is offered for the DCS-System or other function blocks.
OUT	Output Setpoint of the function block in units of OUT-SCALE with status. It is valid, when the function block is in mode AUTO or RCAS. In mode MAN, this value can be specified by the operator/engineer.

Status Error Messages

Table 39. Field Device Status Error Messages

Message	Explanation	Recommended Action
Temp. High	Temperature above allowed limit.	Operation outside temperature limit may damage positioner components and violate electrical safety certification requirements. Stop operating positioner.
Temp. Low	Temperature below allowed limit.	
Invalid Configuration	Invalid configuration.	Correct configuration, perform Restore Factory Settings, rerun Autostart procedure.
Travel Sum Limit	Travel sum has exceeded limit configured.	Check valve performance and conduct maintenance if necessary.
Cycle Count Limit	Cycle count has exceeded limit configured.	Check valve performance and conduct maintenance if necessary.
Input Loop Trim	Input signal requires calibration.	Perform Analog Setpoint Calibration procedure.
Feedback Trim	Feedback unit requires calibration.	Perform Angle Calibration procedure.

Table 39. Field Device Status Error Messages (Continued)

Message	Explanation	Recommended Action
No Autostart Done	No Autostart was done or Autostart was run and did not complete successfully.	Ensure proper mounting of positioner and adequate supply pressure. Refer to on-line Help for other potential causes. Rerun Autostart Calibration procedure.
Position High Alarm	Position above High Alarm Set Point.	Monitor situation or correct cause.
Position Low Alarm	Position below Low Alarm Set Point.	Monitor situation or correct cause.
Position High High Alarm	Position above High High Alarm Set Point.	Monitor situation or correct cause.
Position Low Low Alarm	Position below Low Low Alarm Set Point.	Monitor situation or correct cause.
Control Diff OOL	Difference between set point requested and current position exceeds allowed limit for a user specified time.	Check to ensure that there is adequate supply pressure. Verify tuning parameters. Refer to troubleshooting section of *SRD991 Intelligent Positioner (*MI EVE 0105A).
Binary Input	The Binary Input signal 1 or 2 is active.	Monitor situation or correct cause.
Air Supply Pressure Alarm	The air supply pressure fell below the configured lower limit.	Check to ensure that there is adequate supply pressure.
Output Pressure Alarm	The positioner cannot regulate the output pressure.	Check the pneumatics.
RAM	Error writing positioner memory.	Replace failed item or positioner.
EEPROM	Error writing positioner EEPROM.	Replace failed item or positioner.
ROM	Error writing positioner ROM.	Replace failed item or positioner.
AD Converter	Converter function not controllable.	Replace failed item or positioner.
Actuator OOR	Position is not within permissible range (-5%...+105%).	Check mechanics of actuator and valve. Perform Endpoints calibration.
Current Loop I/P Motor	Connection of I/P converter to electronic board failed.	Replace failed item or positioner.

Table 39. Field Device Status Error Messages (Continued)

Message	Explanation	Recommended Action
Potentiometer	Connection of potentiometer to electronic board failed.	Replace failed item or positioner.
Option Board	Option board was not configured or failed.	Check configuration or replace failed option board.

Calibration

You can perform the following calibration procedures on an SRD991 Intelligent Positioner using IFDC/PC20 software:

- Autostart
- Endpoints
- Analog Setpoint (only allowed at workshop security level)
- Angle (only allowed at workshop security level)
- Temperature (only allowed at workshop security level)
- Position Feedback (only allowed at workshop security level)
- Air Supply Pressure (only allowed at workshop security level)
- Output Pressure (only allowed at workshop security level)
- Restore Valve Specific Parameter (only allowed at workshop security level)
- Restore Factory Settings (only allowed at workshop security level).

Autostart Calibration

This function determines valve travel limits, zero, span, and tuning parameters. It does this in four stages:

- Determining the limits of actuator travel.
- A series of ramps to determine the control system parameters
- A series of steps to determine the control parameters
- Determining the positioning speeds.

! CAUTION

In performing this function, the valve is stroked several times and ramps are applied to the input signal. If the process cannot be disturbed, then Autostart should not be executed.

The procedure to perform an Autostart calibration is:

1. Select **Autostart** from the **Calibration** menu.
2. Acknowledge the warning.

3. Enter the calibration data or suitable message upon successful completion.

If Autostart is not successful, it may terminate before reaching the last step. This means that the positioner is not properly calibrated. To check whether Autostart has been successfully completed or not, select Valve Status from Test in the device top level menu. Potential reasons for Autostart not completing include:

- Positioner mounting problem. Feedback lever or coupling is in the wrong orientation. Refer to Section 1 of *SRD991 Intelligent Positioner* (MI EVE 0105 A) on "getting started".
- Inadequate supply pressure.
- Large actuator. Use Endpoint Calibration and tune manually. Employ boosters to increase output capacity.
- Hardware problem.

Endpoints Calibration

Endpoints calibration automatically detects the valve end points. It does this by using only the first of the four Autostart steps. This process determines the valve mechanical travel stops, zero and span, but not the tuning set. Accordingly, it requires much less time than a full Autostart calibration. If the tuning parameters are available for the control valve from previous testing or existing data, then performing Endpoints calibration and manually entering the tuning set shortens the positioner setup time significantly.

The procedure to perform an Endpoints calibration is:

1. Select **Endpoints** from the **Calibration** menu.
2. Acknowledge the warning.
3. Enter the calibration data or suitable message upon successful completion.

Analog Setpoint Calibration

Analog setpoint calibration enables you to calibrate the upper and lower limits of the current input (4 mA and 20 mA) if the positioner is being used in analog mode. Using the positioner in the analog mode requires jumper selection on the printed wiring board. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for the correct jumper location.

! CAUTION

When in analog mode, the positioner cannot be connected to a voltage source. To do so causes permanent damage to the instrument.

NOTE

This function is only allowed at workshop security level.

The procedure to perform an Analog Setpoint calibration is:

1. Take the positioner out of the process loop and connect it to a current source.
2. Select **Analog Setpoint** from the **Calibration** menu.
3. Set input current to 4 mA.

4. Acknowledge by entering this value (4 mA) in the edit box on the display.
5. Set the input current to 20 mA.
6. Acknowledge by entering this value (20 mA) in the edit box on the display.
7. The screen responds with the message that the Analog Setpoint Calibration has finished.

Angle Calibration

Angle calibration is needed whenever the printed wiring board or the potentiometer is replaced. This operation is typically done on the bench and may require special tools and removal of the positioner from the valve. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for more information.

— NOTE
This function is only allowed at workshop security level.

The procedure to perform an Angle calibration is:

1. Select **Angle** from the **Calibration** menu.
2. The feedback lever is rotated to the lower angle value (typically 45° down from horizontal).
3. Acknowledge by entering the lower angle value into the edit box on the display.
4. The feedback lever is rotated to the upper angle value (typically 45° up from horizontal).
5. Acknowledge by entering the upper angle value into the edit box on the display.
6. The screen responds with a message that the Angle Calibration has finished.

Temperature Calibration

Temperature calibration is needed whenever the printed wiring board is replaced. The function calibrates the temperature of the internal electronics module. It is intended to be performed on the bench. A temperature probe and other special tools are required. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for more information.

— NOTE
This function is only allowed at workshop security level.

The procedure to perform a Temperature Calibration is:

1. Select **Temperature** from the **Calibration** menu.
2. After selecting **Continue** to proceed, measure the electronics temperature with a probe.
3. Enter this value in the edit box on the display and select **Continue**.

The temperature calibration is finished.

Position Feedback Calibration

This function performs calibration of the output of the position feedback option board. This operation is typically done on the bench and may require special tools and special electrical connections. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for more information.

— NOTE

This function is only allowed at workshop security level.

Air Supply Pressure Calibration

Air Supply Pressure Calibration is needed whenever the printed wiring board is replaced. This operation is typically done on the bench and may require special tools. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for more information.

— NOTE

This function is only allowed at workshop security level.

The procedure to perform an Air Supply Pressure Calibration is:

1. Select **Air Supply** from the **Calibration** menu.
2. Regulate the air supply to the LOW supply pressure value.
3. Enter this value in the edit box on the display and select **Continue**.
4. Regulate the air supply to the HIGH supply pressure value.
5. Enter this value in the edit box on the display and select **Continue**.

The Air Supply Pressure Calibration is finished.

Output Pressure Calibration

Output Pressure Calibration is needed whenever the printed wiring board is replaced. This operation is typically done on the bench and may require special tools. Refer to *SRD991 Intelligent Positioner* (MI EVE 0105 A) for more information.

— NOTE

This function is only allowed at workshop security level.

The procedure to perform an output pressure calibration is:

1. Select **Output Pressure** from the **Calibration** menu.
2. Using the pushbuttons, set the setpoint to 0%.
3. Check the pressure gauge attached to the output port of the positioner. Enter this value in the edit box on the display and select **Continue**.
4. Using the pushbuttons, set the setpoint to 100%.
5. Check the pressure gauge attached to the output port of the positioner. Enter this value in the edit box on the display and select **Continue**.

The Output Pressure Calibration is finished.

Restore Valve-Specific Parameter

This function allows writing of valve specific parameters into the positioner. By reading the data file of one positioner mounted to a valve and writing these values into a new positioner, the new positioner is adopted to that valve without performing an Autostart Calibration. However, due to mechanical tolerances in mounting, the adoption is not optimal. Therefore, performing a new Autostart Calibration or Endpoint Calibration is required as soon as possible.

— NOTE

This function is only allowed at workshop security level.

Restore Factory Settings

This function resets all calibration and configuration data back to the calibration and configuration data existing at time of delivery from the factory. The valve's current database is overwritten. This function is useful, for example, when a positioner is taken from one valve and mounted to another valve.

— NOTE

This function is only allowed at workshop security level.

Test

You can perform the following procedures on the SRD991 Intelligent Positioner using the **Test** menu: Go On-Line, Go Off-line, Go Local, Set Setpoint, Reset Status, Reset Counters, Reboot Device, and Write Protect.

Go On-Line

This function sets the device into the on-line mode where normal control is performed. The positioner allows a digital or analog setpoint depending on the configuration of the setpoint source.

Go Off-Line

This function sets the device into the off-line mode where normal control is **not** performed. The pneumatic output is frozen to the last value of the pneumatic output before performing this function.

Go Local

This function sets the device into the local mode. Local mode is similar to on-line mode where normal control is performed. However, the positioner does not follow the digital or analog setpoint from the I/A Series system. It follows the digital setpoint from the IFDC/PC20 configurator.

Set Setpoint

This function allows IFDC/PC20 to specify a setpoint. Activating this function automatically switches the operation mode to the local mode. This gives you the capability for testing step responses and so forth. Leaving this function automatically switches the operation mode to the on-line mode.

Reset Status

This function resets all current and historical status fields including the Diagnostic Status fields.

NOTE

If an underlying problem has not been corrected, the failure bits will be reasserted almost immediately.

Reset Counters

This function resets the Cycle Count and Travel Sum parameters.

CAUTION

This causes the device to be taken off-line for a short period which can cause a process upset.

Reboot Device

This function causes the positioner to be rebooted.

CAUTION

The device behaves as if the power supply were switched off and on. This can cause a process upset.

Write Protect

This function enables or disables write protection for valve parameters. If Write Protect is enabled, the positioner is write protected and inadvertent changing of positioner configuration data is prevented.

Configuration

Identifier Tab Screen

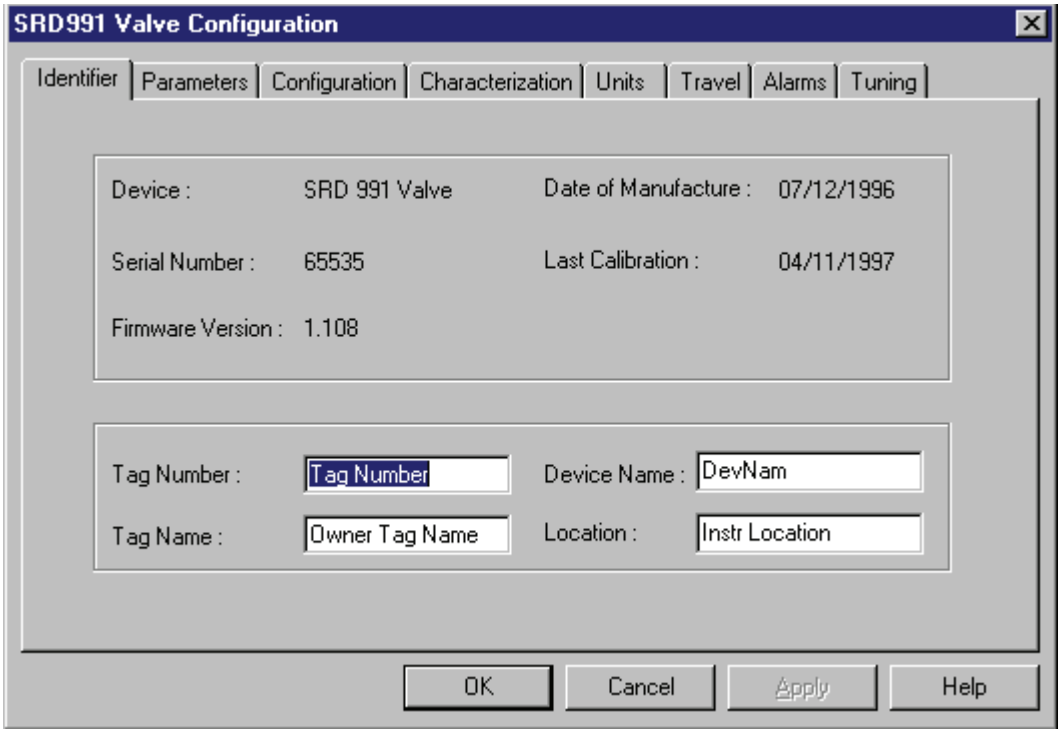


Figure K-3. Sample SRD991 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the positioner configuration filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Parameters Tab Screen

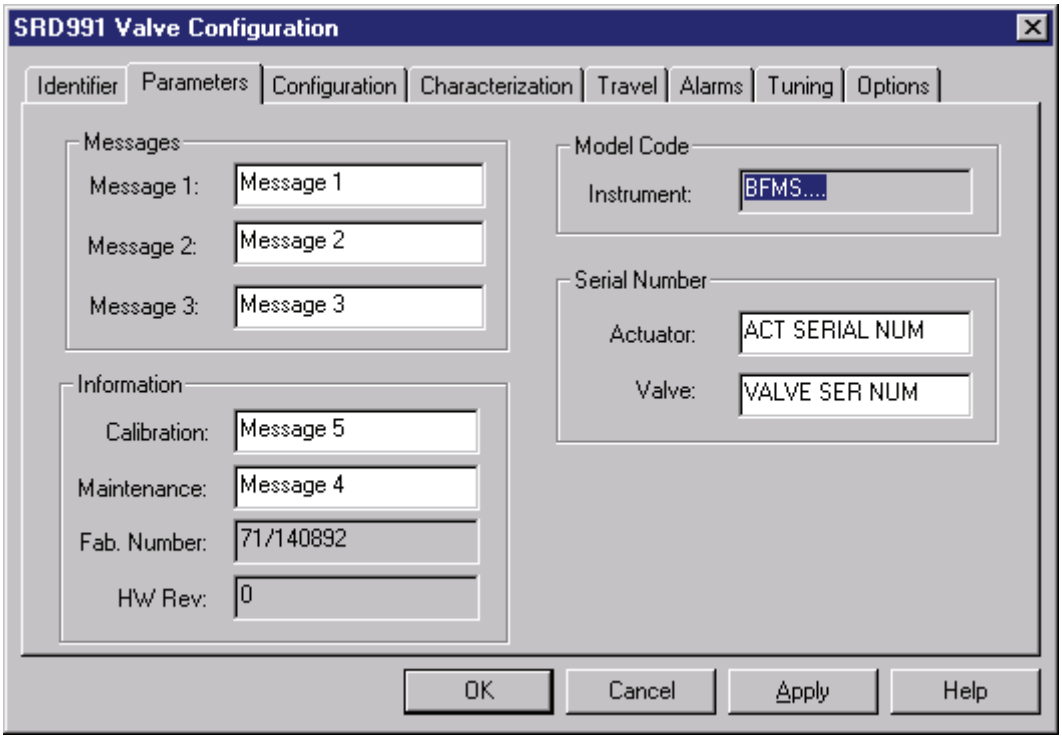


Figure K-4. Sample SRD991 Parameters Tab Screen

Field	Entry
Messages 1, 2, and 3	Enter up to three messages, each up to 14 characters long.
Model Codes	
Instrument	Displays the factory entered positioner model code.
Information	
Calibration	Enter calibration info message (14 characters maximum).
Maintenance	Enter maintenance message (14 characters maximum).
Fab. Number	Displays a factory entered identification number.
HW Rev.	Displays the factory entered hardware revision level.
Serial Number	
Actuator	Enter actuator serial number.
Valve	Enter valve serial number.

Configuration Tab Screen

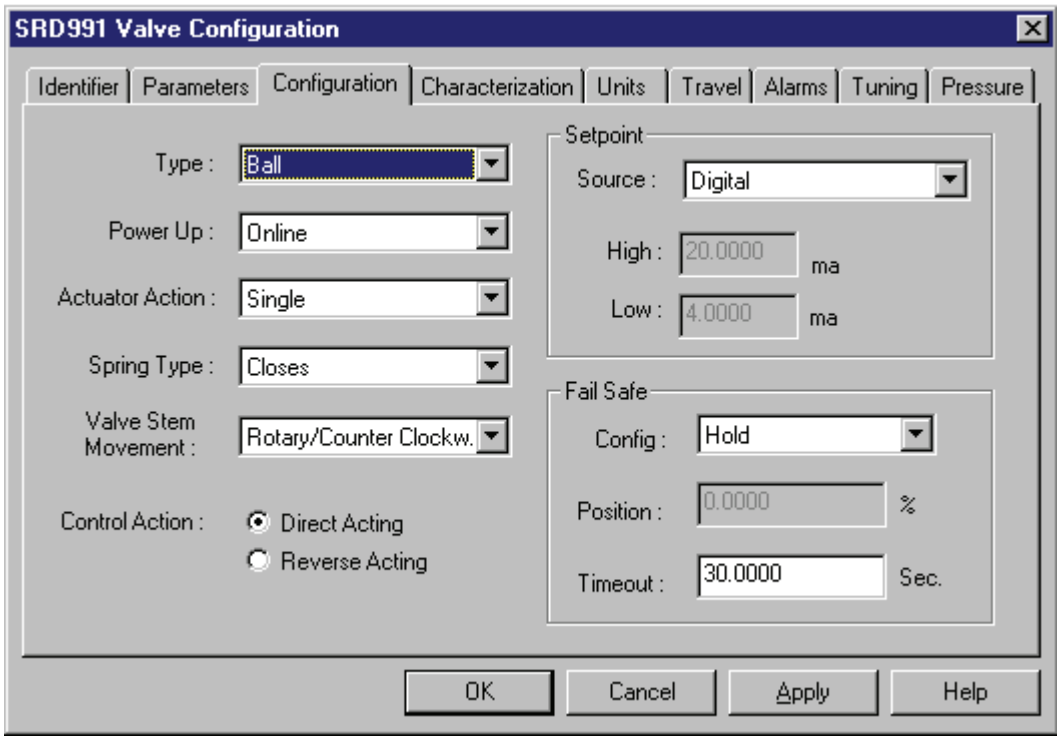


Figure K-5. Sample SRD991 Configuration Tab Screen

Field	Entry
Type	Select **Globe**, **Rotary Plug**, **Butterfly**, **Ball,** or **Diaphragm**.
Power Up	Specify whether you want the valve to start in Failsafe mode or fully On-line.
Actuator Action	Select **Single** or **Double**.
Spring Type	Specify whether the valve **Closes** or **Opens** with a spring or **None** if no spring exists.
Valve Stem Movement	Specify **Linear/Left Mounted**, **Linear/Right Mounted**, **Rotary/Counterclockwise**, or **Rotary/Clockwise**.
Control Action	Specify **Direct** or **Reverse Acting**.
Setpoint Source	Select **Analog**, **Analog High** (4800 Baud), or **Digital**.
High	If Analog, enter value at high end of mA range (20 mA max).
Low	If Analog, enter value at low end of mA range (4 mA min).
Fail-Safe	
Config.	Failsafe occurs when no setpoint command is seen in the timeout specified below. Select the fail-safe condition: **De-Energize** (positioner exhausts all air in the actuator) **Hold** (last valve position) **Fallback** (send to position specified in next field).

Field	Entry
Position	If Fallback, enter position in percent.
Timeout	Enter Timeout in seconds (0 means none).

Characterization Tab Screen

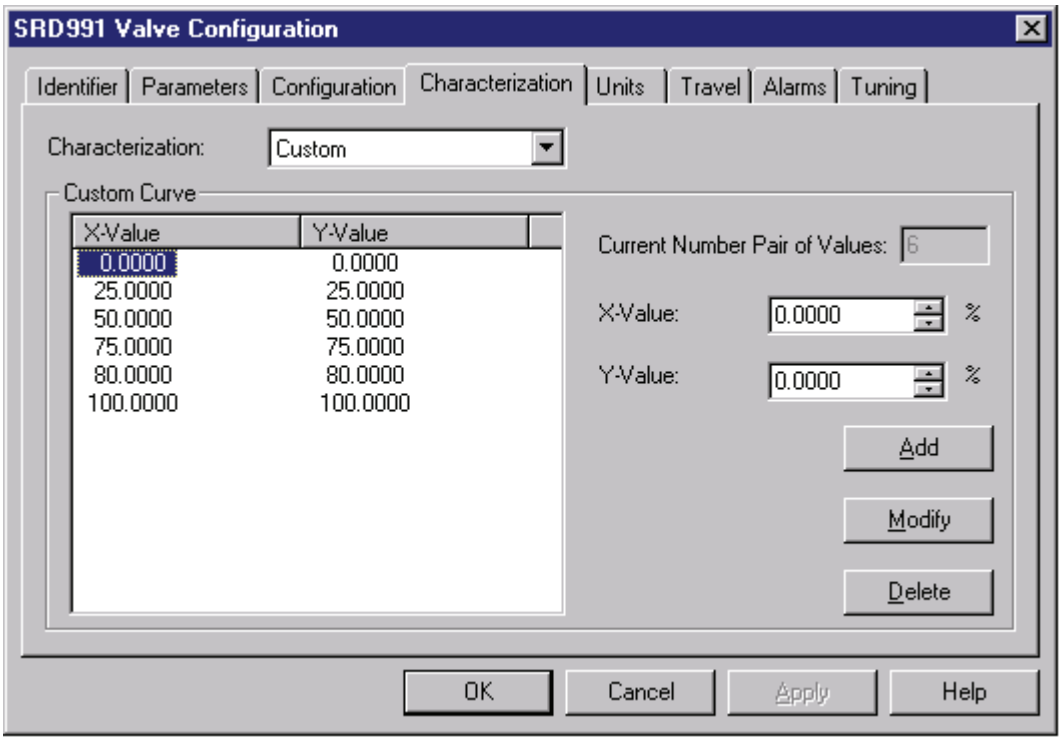


Figure K-6. Sample SRD991 Characterization Tab Screen

Characterization: Select **Linear**, **Equal Percentage (1:50)**, **Quick Open (50:1)**, or **Custom**.

Custom Curve: Allows you to enter a custom curve consisting of up to 22 points (X/Y pairs).

To add a new pair of values, select **Custom,** enter the X- and Y-Values and press **Add.** The input value pair is sorted in increasing order of the X-Values.

To modify a value pair, select the X-Value in the list box, modify the values displayed in the edit boxes, and press **Modify.**

To delete a value pair, select the X-Value in the list box and press **Delete**.

A custom curve which is stored in the device can be activated by selecting **Custom** or deactivated by switching to **Linear**, **Equal Percentage (1:50)** or **Quick Open (50:1)**.

Travel Tab Screen

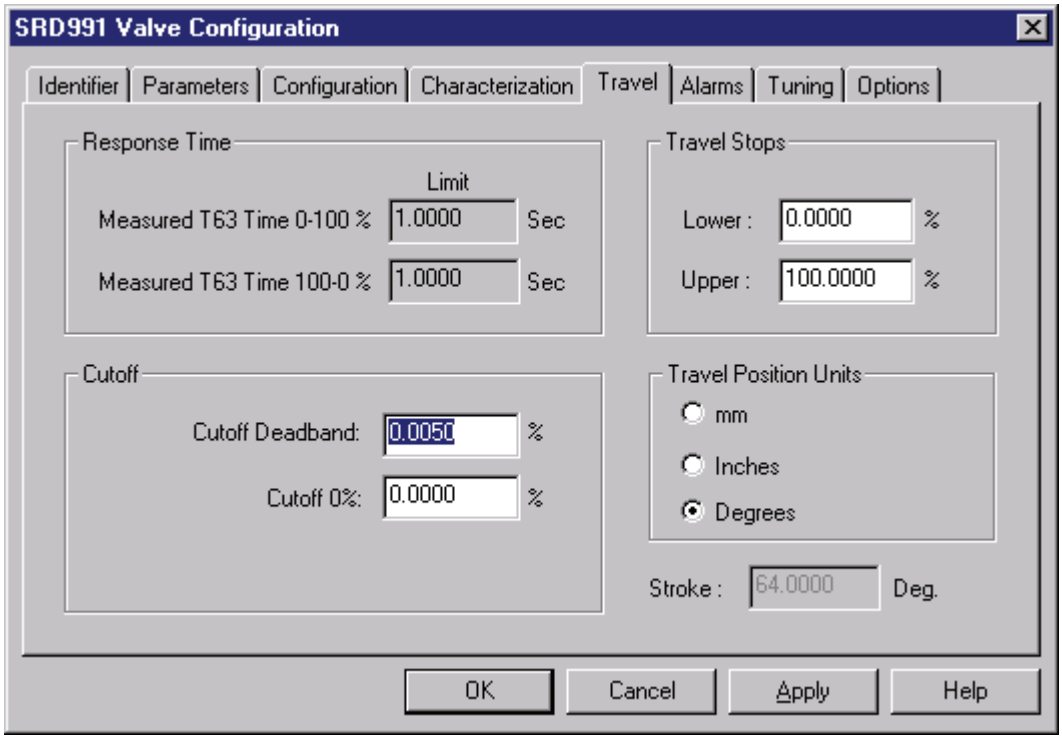


Figure K-7. Sample SRD991 Travel Tab Screen

Field	Entry
Response Time [Limit]	
Measured T63 Time 0-100%	Displays the time it took for the valve to travel 63% of its full stroke in the increasing direction during Autostart.
Measured T63 Time 100-0%	Displays the time it took for the valve to travel 63% of its full stroke in the decreasing direction during Autostart.
Travel Stops	
Lower	Enter lower travel stop in percent of total stroke.
Upper	Enter upper travel stop in percent of total stroke.
Cutoff	
Cutoff Deadband	Enter the amount of hysteresis in percent of travel required above the cutoff value before the valve can reopen again. For example, with 2% cutoff, 0.5% cutoff hysteresis allows the valve to reopen at 2.5%.
Cutoff %	Enter the value in percent of travel below which the valve is fully closed. For example, when set at 2%, any signal below 2% is treated as 0%.
Travel Position Units	Select **mm**, **Inches**, or **Degrees**
Stroke	Enter the stroke in the units specified.

Alarms Tab Screen

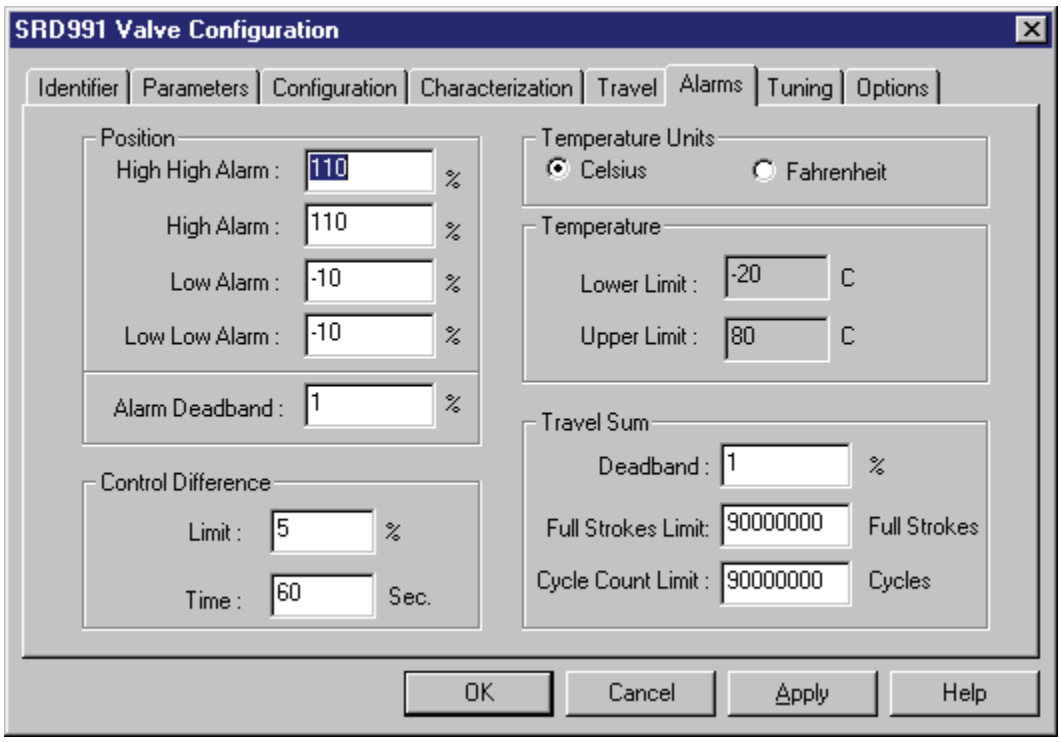


Figure K-8. Sample SRD991 Alarms Tab Screen

Field	Entry
Position	Allows setting position limits at which alarms are triggered.
High High Alarm	Enter high high (full) alarm position in percent of stroke.
High Alarm	Enter high (warning) alarm position in percent of stroke.
Low Alarm	Enter low (warning) alarm position in percent of stroke.
Low Low Alarm	Enter low low (full) alarm position in percent of stroke.
Alarm Deadband	Enter alarm deadband in percent of travel.
Control Difference	Allows setting an alarm when the actual position varies from the setpoint by a specified amount for a specified time.
Limit	Enter the amount in percent of travel.
Time	Enter the time in seconds.
Temperature Units	Select **Celsius** or **Fahrenheit**.
Temperature	Displays temperature limits of the positioner in units specified on the Units Tab screen.
Lower Limit	
Upper Limit	
Travel Sum	Allows setting alarms on total stroke for maintenance purposes.
Deadband	Enter deadband in percent of stroke. Small movements below this value are not included in the travel sum.

Field	Entry
Full Strokes Limit	Enter the alarm condition in number of full strokes. Partial movement larger than the deadband value are included in this total (for example, four 1/4 strokes are counted as one full stroke).
Cycle Count Limit	Enter the alarm condition in number of cycles. Each cycle is a change in value direction, any movement up or down, which exceeds sensitivity of the device.

Tuning Tab Screen

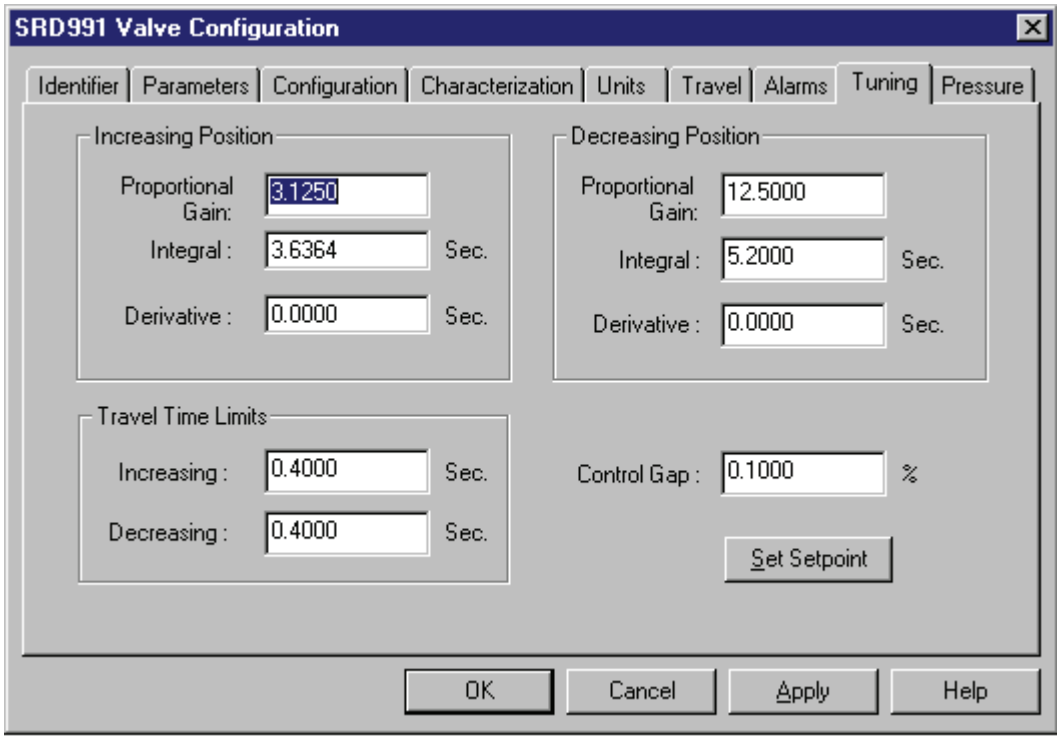


Figure K-9. Sample SRD991 Tuning Tab Screen

Field	Entry
Increasing Position	
Proportional	Enter proportional gain value.
Integral	Enter reset time in seconds.
Derivative	Enter derivative time in seconds.
Decreasing Position	
Proportional	Enter proportional gain value.
Integral	Enter reset time in seconds.
Derivative	Enter derivative time in seconds.

Field	Entry
Travel Time Limits	
Increasing	Entering values higher than the defaults slows down response. Travel time limits are used to modify control valve dynamics.
Decreasing	
Control Gap	Control gap defines the sensitivity of the positioner so that no corrective action is taken if the control difference is less than the defined limit.

Pressure Tab Screen

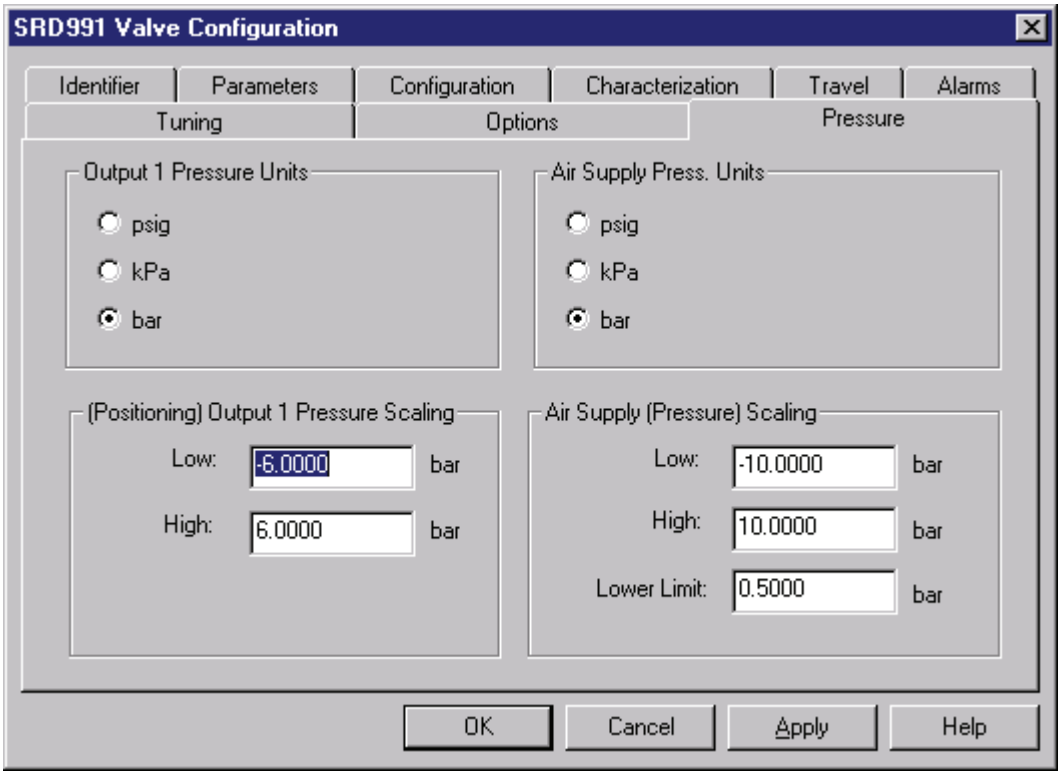


Figure K-10. Sample SRD991 Pressure Tab Screen

Field	Entry
Output 1 Pressure Units	Select **psig**, **kPa**, or **bar**.
Air Supply Pressure Units	Select **psig**, **kPa**, or **bar**.
(Positioning) Output Pressure Scaling	
Low	Enter low limit for output pressure sensor. Default is 0 psig.
High	Enter high limit for output pressure sensor. Default is 87 psig (6 bars).
Air Supply (Pressure) Scaling	
Low	Enter low limit for supply pressure sensor. Default is 0 psig.

Field	Entry
High	Enter high limit for supply pressure sensor. Default is 87 psig (6 bars).
Lower Limit	Enter the value for supply pressure below which an alarm is triggered.

Options Tab Screen

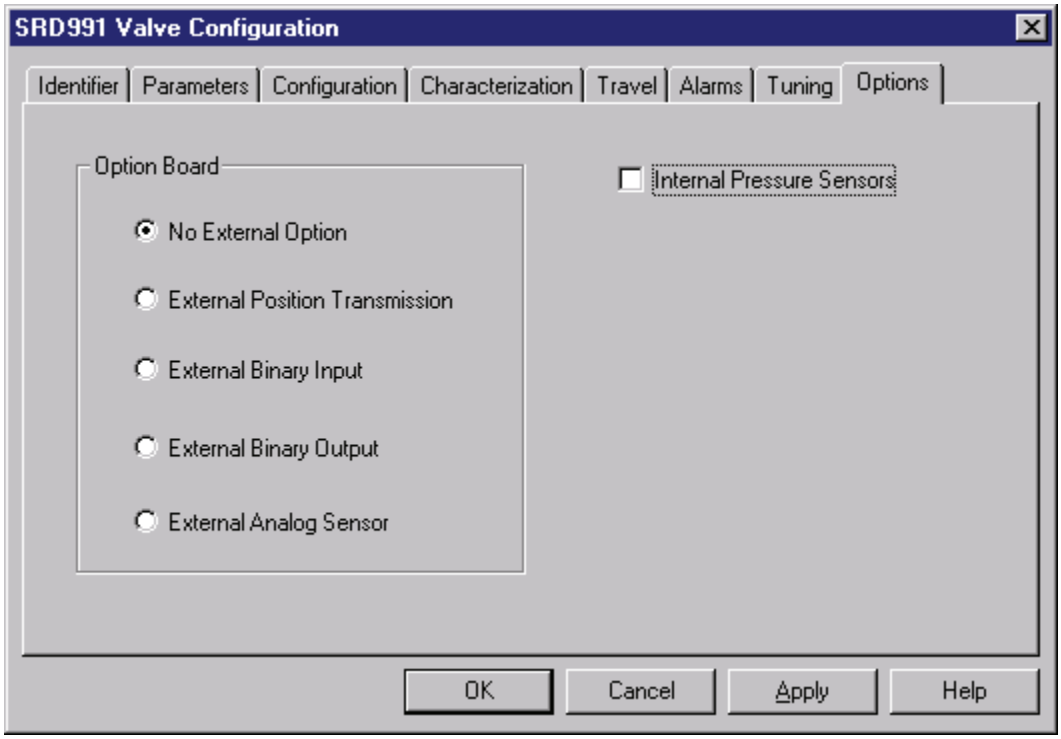


Figure K-11. Sample SRD991 Options Tab Screen

Field	Entry
Option Board	Select from the following: **No External Option** **External Position Transmission** **External Binary Input** **External Binary Output** **External Analog Sensor**
Internal Pressure Sensors	Select or deselect internal pressure sensors.

Bin In Tab Screen

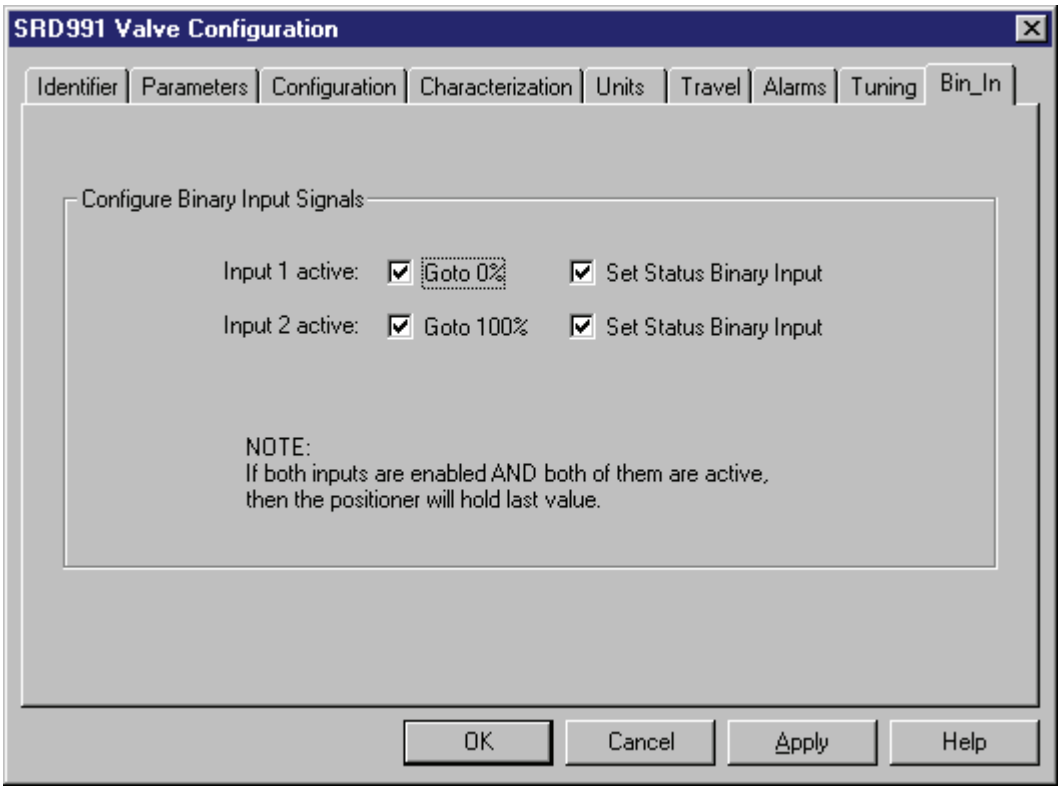


Figure K-12. Sample SRD991 Bin In Tab Screen

The Binary Input option features two independent binary inputs with internal supply for connection of sensors. A connected switch is loaded with 3.5 V and 0.15 mA.

Using the Bin In Tab screen, you can configure an active signal to activate an alarm or force the actuator to go to 0% or 100%.

Bin Out Tab Screen

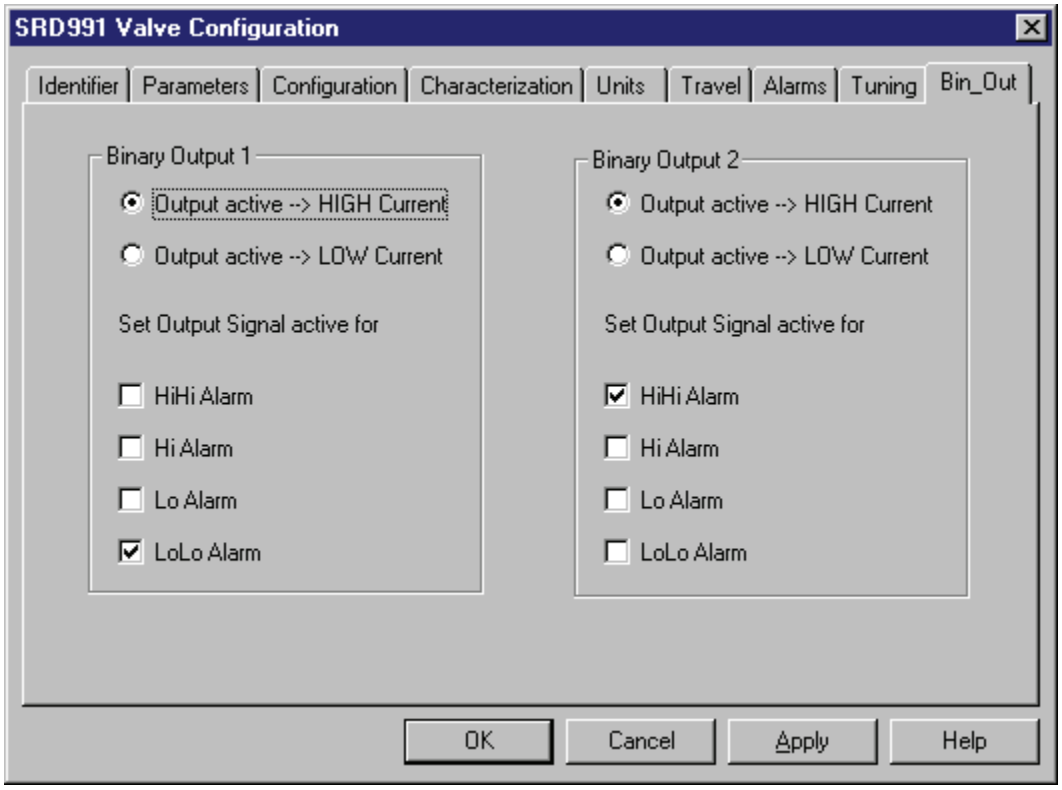


Figure K-13. Sample SRD991 Bin Out Tab Screen

The Binary Output option enables you to define which alarm activates the binary input.

Profibus Function Block Tab Screen

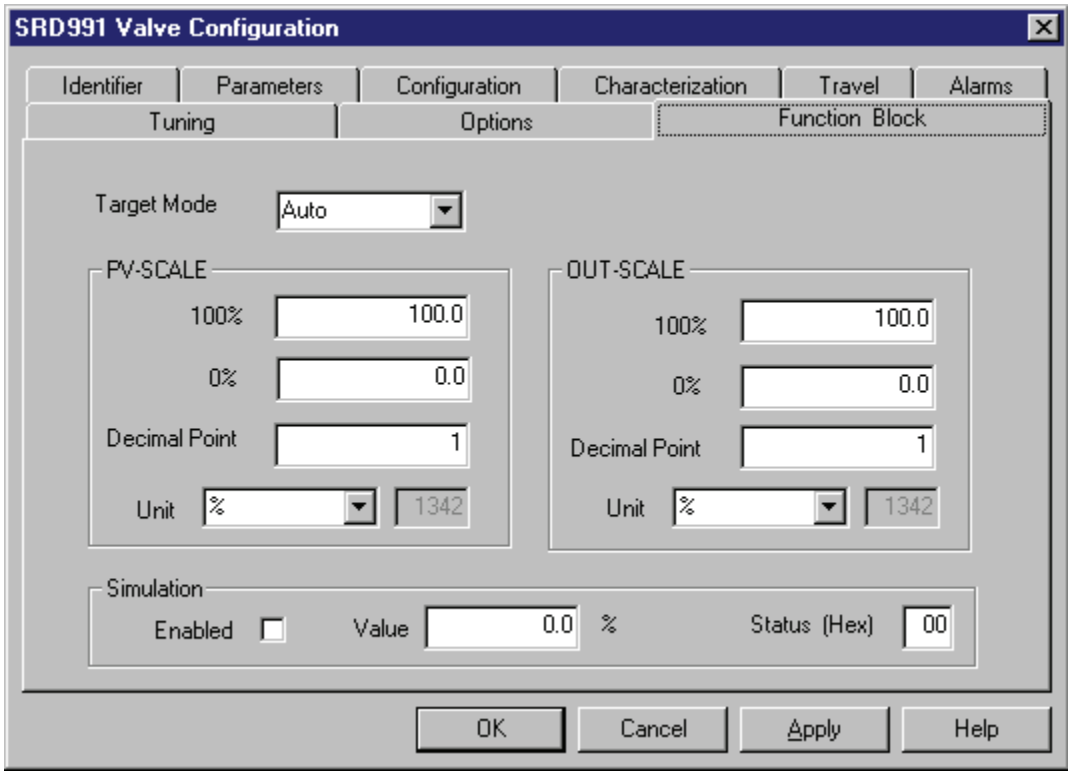


Figure K-14. Sample Profibus Function Tab Screen

Fields	Entries
Target Mode	Contains the desired mode of the function block.
PV-SCALE:	Conversion of a process value in the defined engineering units to a normalized value in percent as the input value of the function block. It contains the high and low scale values, engineering units code, and number of digits to the right of the decimal point. As default, PV-PSCALE is configured to percent, meaning that the Variables SP, Readback, RCAS_INf and RCAS_OUT, which are depending on PV-SCALE, are displayed in the range 0-100%.

Fields	Entries
OUT-SCALE:	Conversion of the normalized Output Signal (in percent) of the function block to the OUT parameter in the defined engineering units. It contains the high and low scale values, engineering units code, and number of digits to the right of the decimal point. As default, OUT-SCALE is configured to percent, meaning that the Variable OUT is displayed in the range 0-100%.
Simulation	Allows definition of a value and a status. When Simulation is enabled, this value and status is given in Readback instead of the real position of the actuator/valve. This set of parameters is intended only for commissioning and maintenance reasons.

Database Report

Table 40. Sample Database Report

Parameter	Value	Parameter	Value
Device Type	0x24	X16 Value	0.
Geographic Location	INSTR LOCATION	X17 Value	0.
Manufacturing Date	00/20/2104	Y17 Value	2.802596929e-045
Firmware Revision	0x1	X18 Value	0.
Device Name	DevNam	Y18 Value	0.
Sensor Number	0xff	X19 Value	0.
Tag Number	FT103A	Y19 Value	9.248569865e-044
Calibration Date	08/20/2087	X20 Value	0.
Instrument S/N	INSTR SER NU	Y20 Value	0.
Actuator S/N	ACT SERIAL N	X21 Value	0.
Valve S/N	VALVE SER NU	Y21 Value	0.
Message #1	MESSAGE1	Flow Characteristic	0x0
Message #2	MESSAGE2	Travel Pos. Units	0xf2
Message #3	MESSAGE3	Temperature Units	0x21
Maintenance Info	MESSAGE4	Air Supply Pressure	0x7
Calibration Info	MESSAGE5	Outlet Pressure Unit	0x7
Device Options	0x0	Lower Travel Stop	0.
Fabrication Number	0	Upper Travel Stop	0.
Hardware Revision	0x2	Cutoff	0.
Mounting Compensation	0x3	Cutoff Hyst.	0.
Power Up Action	0x1	Stroke	-73556496.
Spring Type	0x1	Response Time (Inc)	0.
Actuator Action	0x1	Response Time (Dec)	0.

Table 40. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Valve Type	0x1	High Alarm	0.
Control Action	0x1	High High Alarm	0.
Failsafe Config	0x0	Low Alarm	0.
Failsafe Timeout	2.313824024e-041	Low Low Alarm	0.
Fallback Position	9.422788258e-038	Cycle Count Limit	30ab6e01
Setpoint Source	0x3	Travel Deadband	0.
Analog Setpoint Lo	9.219562986e-041	Travel Sum Limit	30ab6e01
Analog Setpoint Hi	1.084202302e-019	Control Diff. Limit	0.
# Characterizer Pts	0x2	Control Diff. Time	0.
X0 Value	0.	Alarm Deadband	0.
Y0 Value	0.	Temp. Lower Limit	0.
X1 Value	3.201686731e-041	Temp Upper Limit	0.
Y1 Value	3.201686731e-041	P Term (Dec.)	0.
X2 Value	0.	I Term (Dec)	0.
Y2 Value	1.040505355e-035	D Term (Dec)	0.
X3 Value	0.	P Term (Inc)	0.
Y3 Value	1.040505355e-035	I Term (Inc)	2.727090083e+023
X4 Value	0.	D Term (Inc)	0.
Y4 Value	0.	Rate Limit (Inc)	0.1000000015
X5 Value	0.	Rate Limit (Dec)	0.1000000015
Y5 Value	0.	Control Gap	0.
X6 Value	0.	Setpoint	28.
Y6 Value	0.	Measurement Scan	1212
X7 Value	0.	Valve Position	1111
Y7 Value	0.	Stem Setpoint	1313
X8 Value	0.	Air Supply Pressure	1414
Y8 Value	0.	Output Pressure	1515
X9 Value	0.	Control Difference	0.
Y9 Value	0.	Travel Position	0.
X10 Value	0.	Travel Sum	0.
Y10 Value	0.	Internal Temperature	5.831554006e-039
X11 Value	0.	Cycle Count	0.
Y11 Value	1.016595295e-034	Analog Setpoint	2.980232239e-008
X12 Value	0.	Lower Input Current	5.758085329e-039
Y12 Value	0.	Upper Input Current	5.831554006e-039
X13 Value	0.	Output Cal (Gain)	0.
Y13 Value	0.	Output Cal (Zero)	0.
X14 Value	0.	Calibrate Lower Angl	1.069022572e-040
Y14 Value	0.	Calibrate Upper Angl	0.
X15 Value	0.	Temperature Cal	2.053743029e-041
Y15 Value	0.	Calibrate Air Supply	-1.591403656e-023
Calibrate Air Supply	-107454968.		
Calibrate Output Min	-7.321920847e-014		
Calibrate Output Max	9.108440018e-044		
Primary Status	0x0		

Table 40. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Secondary Status	0x0		
Diagnostic Error	0x0		
DB Change Count	0x3		
Device Sub-Type	0x1		
Instrument Mode	0x1		
Additional Status	0x1		
Air Supply Pressure	2.350988982e-038		
Air Supply Pressure	0.		
Output Pressure Min	8.968310172e-044		
Output Pressure Max	9.248569865e-044		
Auto Start Status	0x1		
Reset Status	0x0		
Restore Factory	0x0		
Write Protect	0x0		

Appendix L. 140/130 Series Pressure and Level Transmitters

This appendix provides information that is exclusive to the 140/130 Series Pressure and Level Transmitters regarding the Intelligent Field Device Configurator. There are three types of 140 Series transmitters:

- 140 Series with HART protocol
- 140 Series with FoxCom protocol
- 140 Series with FoxCom protocol and with I/A Series Intelligent Pressure Transmitter compatibility.

The difference between the first two types is the protocol itself and some protocol-specific differences. The third type is a FoxCom device that is compatible with the I/A Series Intelligent Pressure Transmitters. This means that for the calibration, configuration, status windows, and so forth, the same functions are used as for the I/A Series Pressure Transmitters described in Appendix A.820, 860, and I/A Series Pressure Transmitters,.

The 130 Series Pressure and Level Transmitters are only available with HART protocol. From the configuration point of view, the behavior of the 130 Series and the 140 Series HART devices are identical. Please refer to “140 Series with FoxCom or HART Protocol” on page 262 for a detailed description of the configuration user interface.

140 Series with FoxCom Protocol and with I/A Series Intelligent Pressure Transmitter Compatibility

The transmitters delivered from the factory are in the IDP10-B compatibility mode. The 140 Series FoxCom transmitter identifies itself as a IDP10-B transmitter type. In this IDP10-B compatibility mode, it is possible to configure and calibrate the transmitter with the PC10, the HHT, and IMTW that is integrated in I/A Series software V4.2 and below. See the appropriate documentation for these products for more information and the technical note TI EMP0600B for detailed information about calibration and reranging.

If this transmitter is in the IDP10-B compatibility mode and is connected to the IFDC/PC20, it displays the message box shown in Figure L-1 during the startup phase.

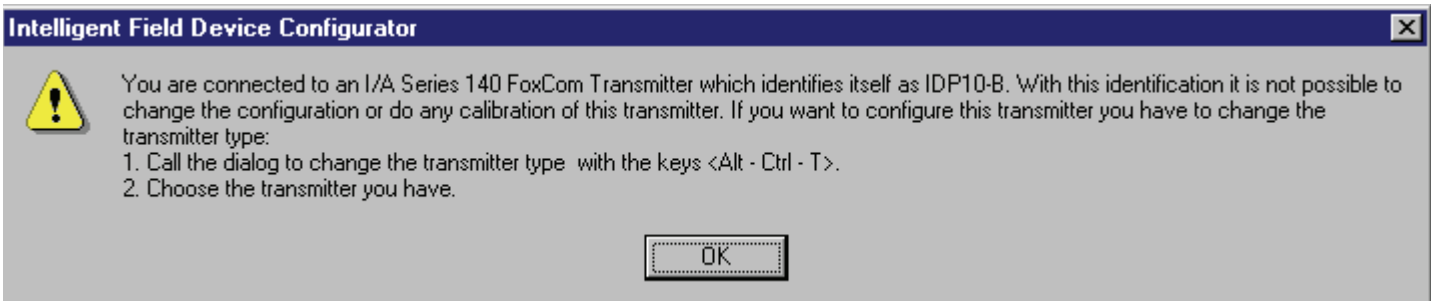

Intelligent Field Device Configurator
You are connected to an I/A Series 140 FoxCom Transmitter which identifies itself as IDP10-B. With this identification it is not possible to change the configuration or do any calibration of this transmitter. If you want to configure this transmitter you have to change the transmitter type:
1. Call the dialog to change the transmitter type with the keys <Alt - Ctrl - T>.
2. Choose the transmitter you have.
OK

Figure L-1. Identification of a 140 Series Transmitter Running in IPD10-B Compatibility Mode

The PC20 software recognizes that the connected device is a 140 Series transmitter running in the IDP10-B compatibility mode. In this mode it is not possible to change the configuration or to do any calibration of the transmitter. The measurement information from the device, however, is continuously read and displayed in the Device Data window, as shown in Figure L-2.

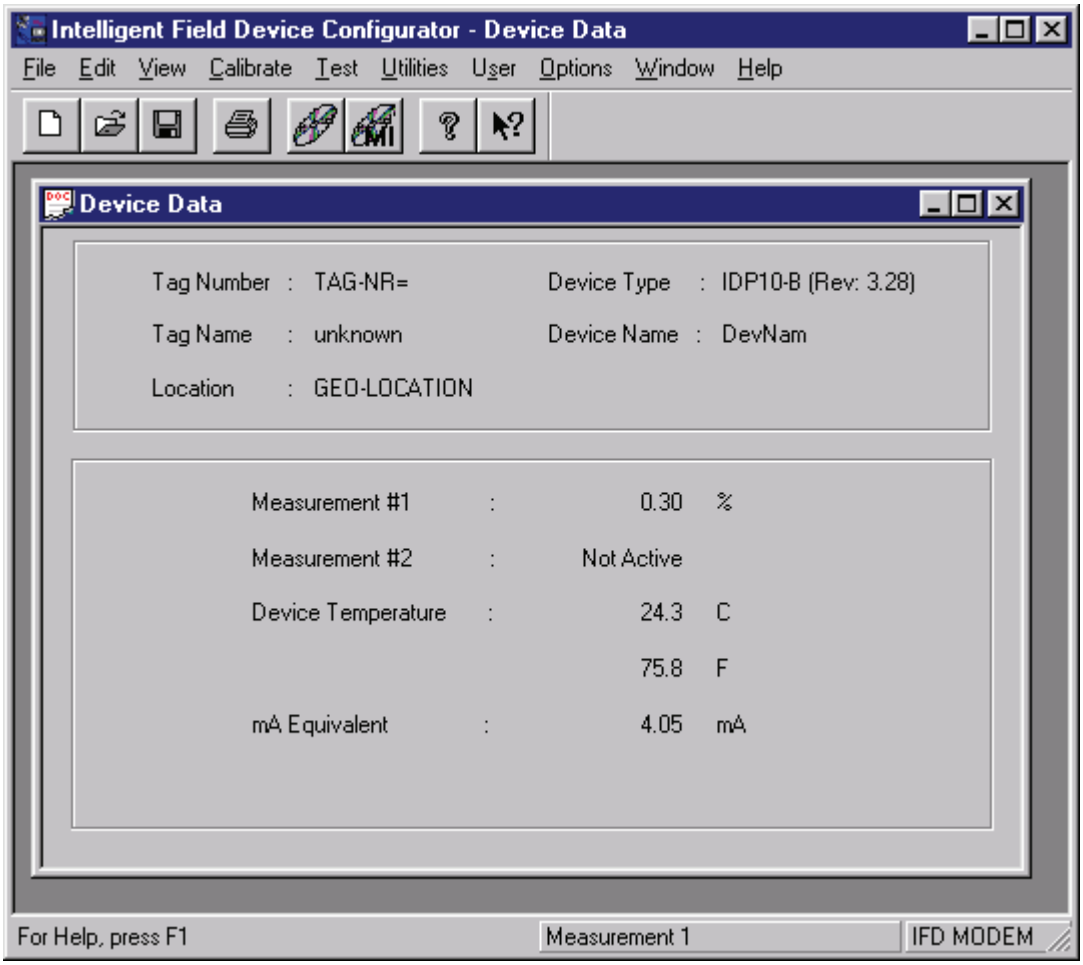

Intelligent Field Device Configurator - Device Data
File Edit View Calibrate Test Utilities User Options Window Help
Device Data
Tag Number : TAG-NR=
Device Type : IDP10-B (Rev: 3.28)
Tag Name : unknown
Device Name : DevNam
Location : GEO-LOCATION
Measurement #1 : 0.30 %
Measurement #2 : Not Active
Device Temperature : 24.3 C
75.8 F
mA Equivalent : 4.05 mA
For Help, press F1
Measurement 1
IFD MODEM

Figure L-2. Sample Device Data Screen for a 140 Series Transmitter in IDP10-B Compatibility Mode.

How to Change the 140 Series Compatibility Type

If the 140 Series Transmitter is in the IDP10-B compatibility mode, it is not possible to change the configuration, to do any calibration, documentation, and so forth with the PC20 software. With the key combination **Alt** + **Ctrl** + **T** it is possible to change the compatibility mode of the 140 Series Transmitter. Pressing this key combination brings up the message box shown in Figure L-3 and then in Figure L-4. Before you call this dialog box, you need to know the model code of the transmitter. This information can be found on the transmitter nameplate labeled as "MODEL." In the successive selection dialog box, shown in Figure L-5, the model can be selected. (Example: For a MODEL 141GP-B, select I141GP-B.) This procedure changes only the transmitter type. Any configuration or calibration done in another mode is not changed.

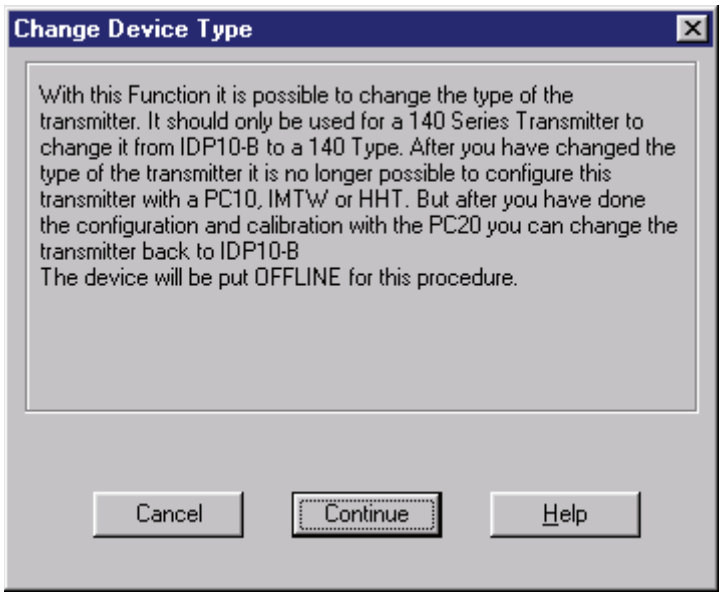

Change Device Type
With this Function it is possible to change the type of the transmitter. It should only be used for a 140 Series Transmitter to change it from IDP10-B to a 140 Type. After you have changed the type of the transmitter it is no longer possible to configure this transmitter with a PC10, IMTW or HHT. But after you have done the configuration and calibration with the PC20 you can change the transmitter back to IDP10-B
The device will be put OFFLINE for this procedure.
Cancel
Continue
Help

Figure L-3. Change Device Type Message Screen

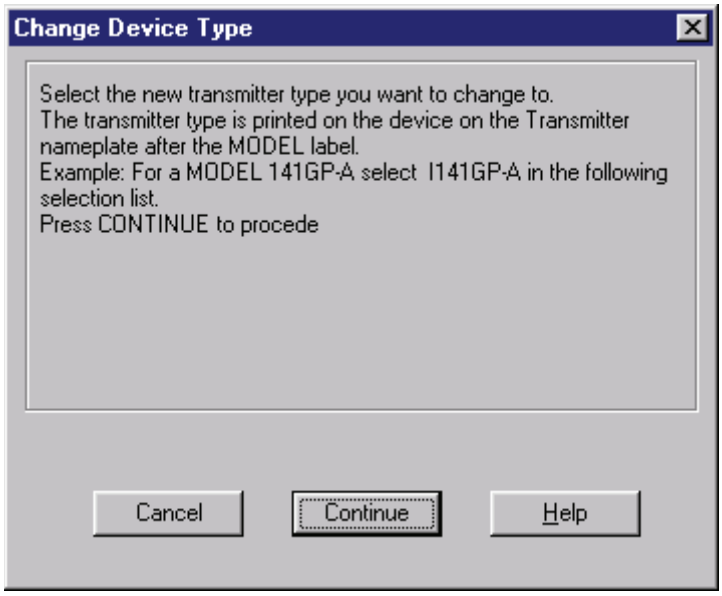

Change Device Type
Select the new transmitter type you want to change to.
The transmitter type is printed on the device on the Transmitter nameplate after the MODEL label.
Example: For a MODEL 141GP-A select I141GP-A in the following selection list.
Press CONTINUE to procede
Cancel
Continue
Help

Figure L-4. Model Identification Message Screen

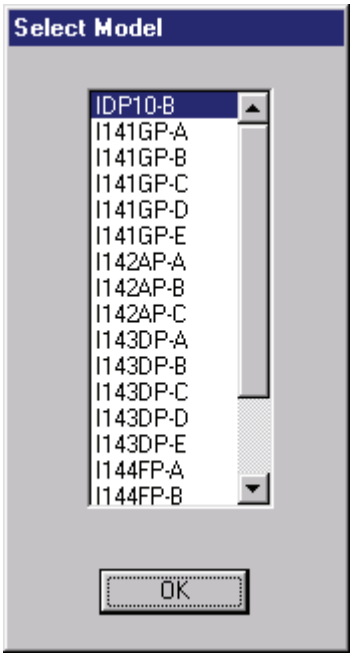


Figure L-5. Model Selection Screen

Now the transmitter is in the 140 Series mode and from now on is identified as the transmitter type corresponding to the Model Code printed on the device. Figure L-6 shows the Device Data screen after changing the mode. In this mode, it is possible to do such tasks as configure, calibrate, and document the transmitter with the PC20. The other configurators (PC10, HHT, and IMTW) are not able to identify this type and can no longer be used for these tasks.

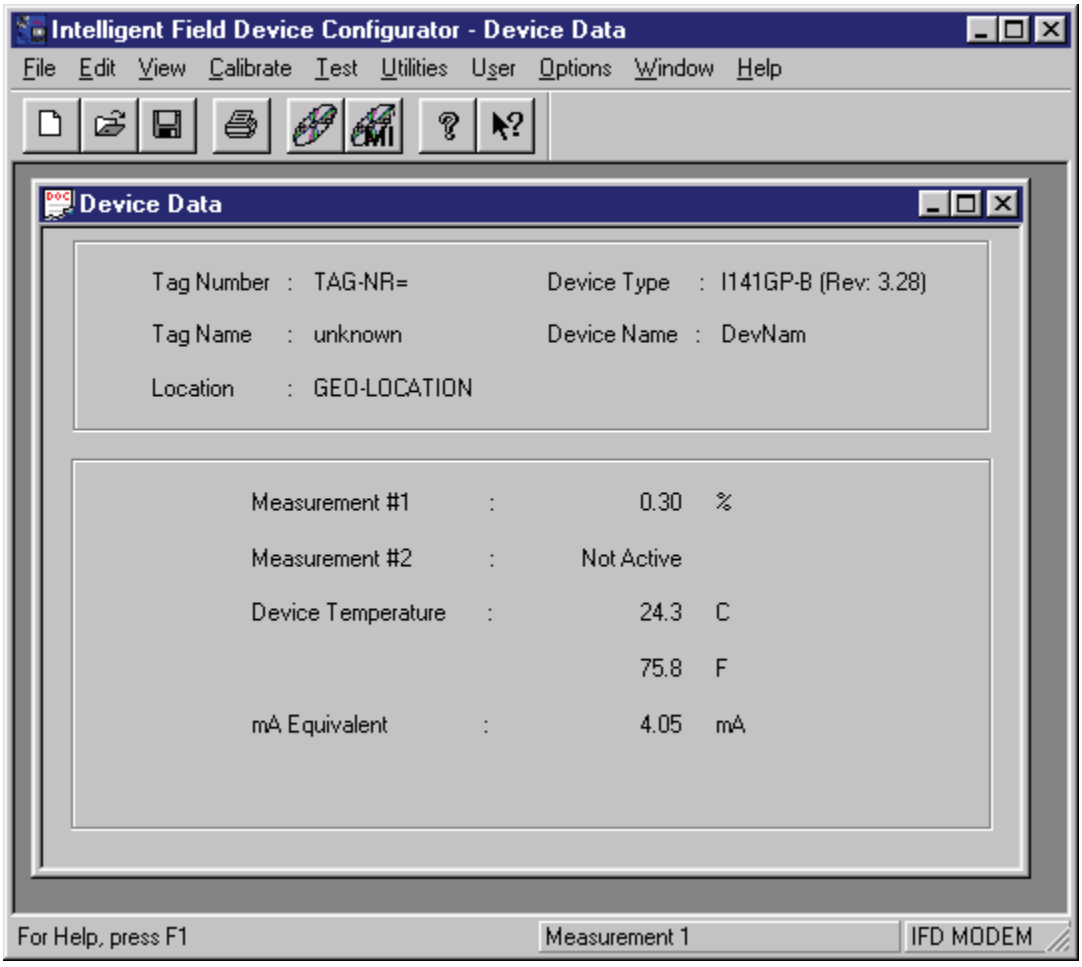

Intelligent Field Device Configurator - Device Data
File Edit View Calibrate Test Utilities User Options Window Help
Device Data
Tag Number : TAG-NR=
Device Type : I141GP-B (Rev: 3.28)
Tag Name : unknown
Device Name : DevNam
Location : GEO-LOCATION
Measurement #1 : 0.30 %
Measurement #2 : Not Active
Device Temperature : 24.3 C
75.8 F
mA Equivalent : 4.05 mA
For Help, press F1
Measurement 1
IFD MODEM

Figure L-6. Sample Device Data Screen for a 140 Series Transmitter in the 140 Series Mode

Using the PC20 to calibrate and configure the 140 Series transmitters is much easier, because the software recognizes the model-specific differences. The model-specific parameters can be written to the transmitter by selecting the menu item **Calibration > Restore Default**.

NOTE

This function should not be used when the transmitter is preconfigured and calibrated by the factory or someone else for specific usage. It resets the device to the default calibration and range settings.

If the PC20 is used to do the initial configuration and calibration steps, the model-specific parameters must be written to the transmitter by calling the menu item **Calibration > Restore Default**.

When the 140 Series transmitter is specifically identified (for example, I141GP-B), the transmitter can be calibrated and configured as described for the I/A Series Pressure Transmitters in Appendix A.820, 860, and I/A Series Pressure Transmitters,. All functions and displays are the same.

If PC20 is only used to do the calibration and configuration steps for the device setup, and afterwards the other configurators (PC10, HHT, or IMTW) are used in the operator's

environment, it is possible to change the transmitter type back to the IDP10-B mode with the same procedure as described above. Any calibration and configuration done by the PC20 is not changed.

140 Series with FoxCom or HART Protocol

There is very little difference between these two transmitters except for the protocol itself and some protocol-specific functions. The user interface for the configuration, calibration, and so forth are the same and, therefore, described together in this section.

The FoxCom device has the same functionality as the HART device. However, the 140 Series FoxCom transmitter with I/A Series Intelligent Pressure Transmitters compatibility described in the previous section has the functionality compatible to the I/A Series Pressure Transmitters.

Device Data Screen

The Device Data display shows the static information Tag Number, Tag Name, and Device Type and data which is updated continuously, such as Measurement #1 (Primary Variable PV), Electronic and Sensor Temperature, and the mA Output, if in analog mode, as shown in Figure L-7.

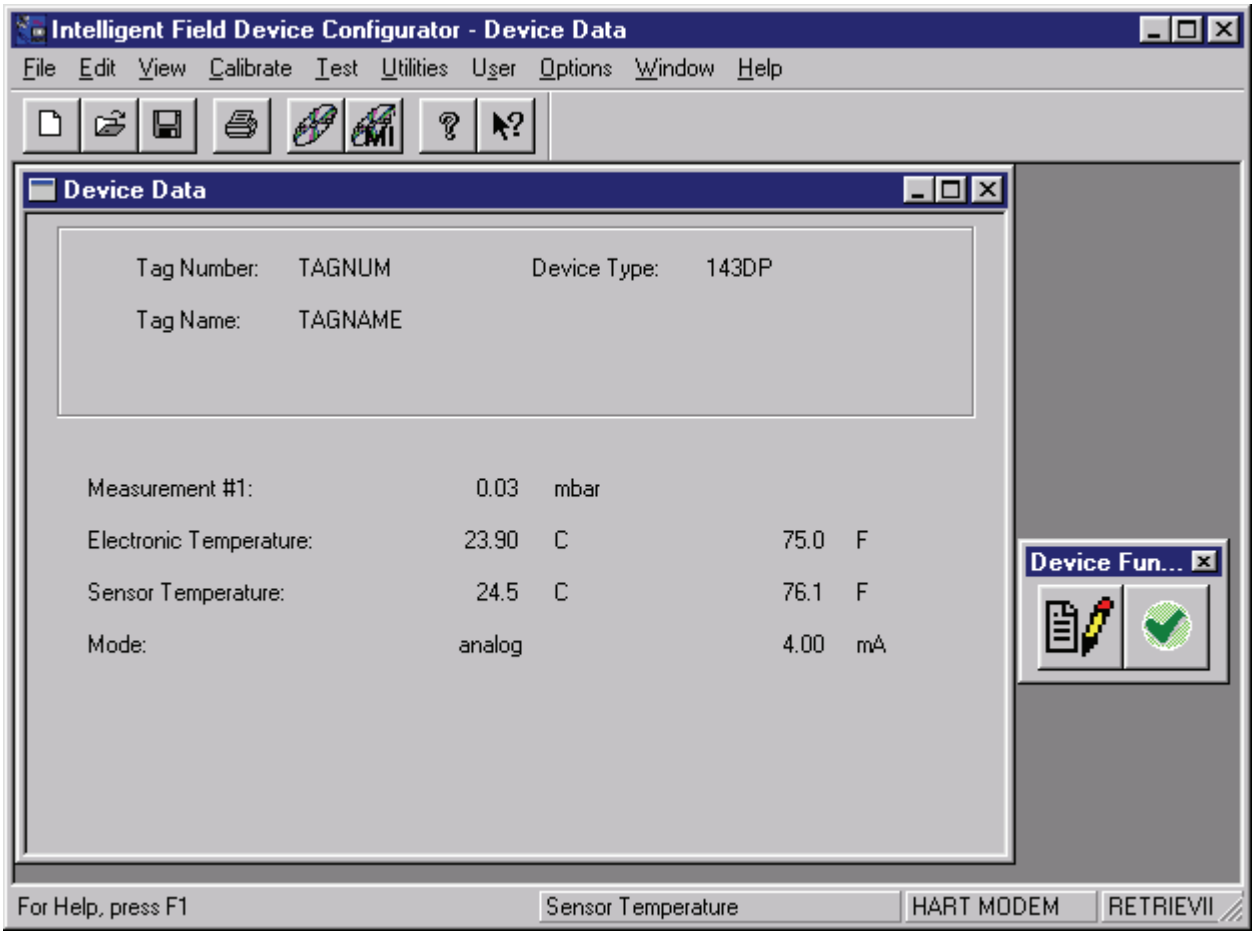


Figure L-7. Sample Device Data Screen

Device Status Screen

The Device Status screen shows the actual and historical status of the transmitter. It is accessed via the **Test** menu from the device top level menu or the Status icon on the device toolbar. The Historical status is a list of status information which was set at least once in the past. The Historical status information can be acknowledged/reset by selecting the menu item **Reset Changed Flag**.

Figure L-8 shows a sample status screen for a HART device. The layout of the status screen for a FoxCom device is different.

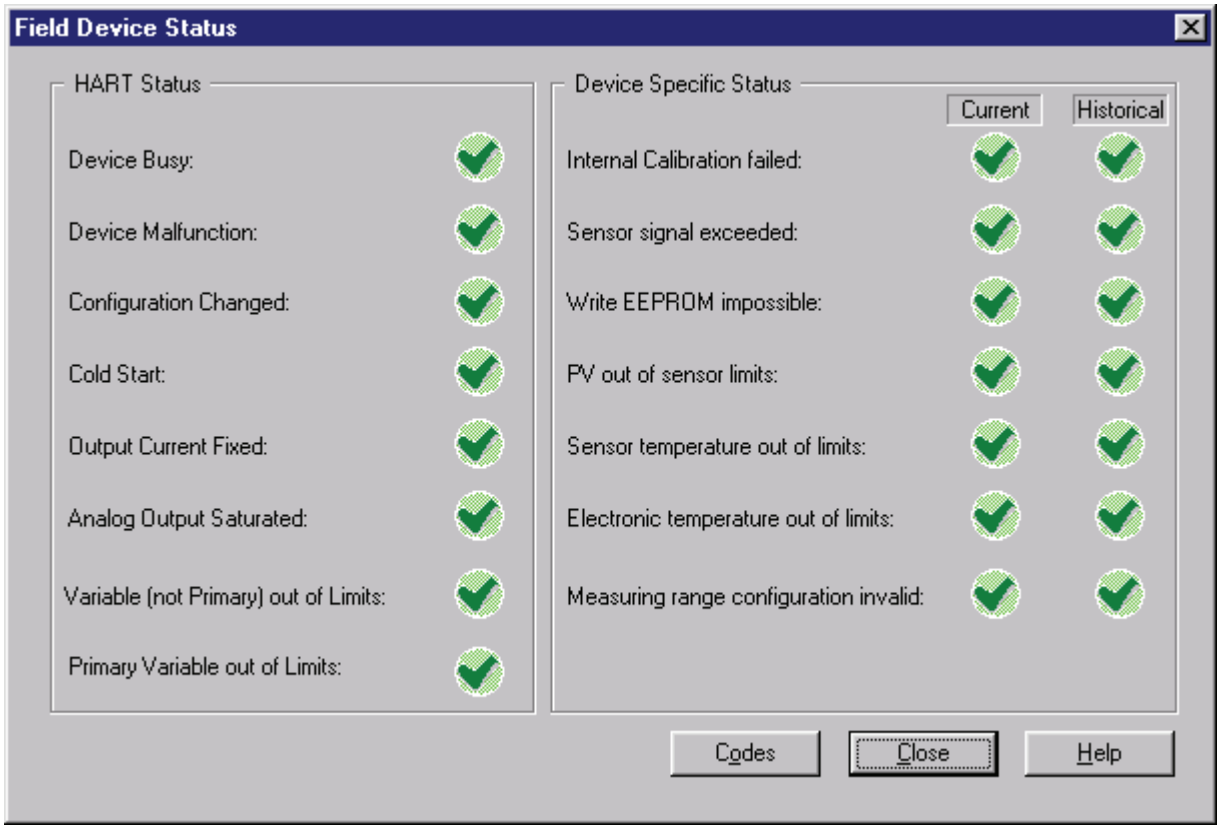


Figure L-8. Sample Device Status Screen

Table 41. HART Transmitter Status

Message	Explanation	Recommended Action
Device Busy	Transmitter is busy.	Try the command later again.
Device Malfunction	Severe problem.	Check the other status bits.
Configuration Changed	The configuration of the transmitter has been changed.	This flag can be reset with the menu item **Reset Changed Flag.**
Cold Start	Device rebooted.	Check power supply.

Table 41. HART Transmitter Status (Continued)

Message	Explanation	Recommended Action
Output Current Fixed	The output current is fixed. The reason might be that it is in the fail-safe state.	The Device Specific Status may show the reason for the fail-safe state. When the reason for the fail-safe is gone with the menu item **Return from Failsafe**, it is possible to leave this state.
Analog Output Saturated	Analog Output out of 4 to 20 mA range.	The Primary Value (PV) exceeds the configured range. Check range limits.
Variable (not Primary) out of Limits	Electronic or sensor temperature out of limits.	Check device specific status for more information.
Primary Variable out of Limits	Sensor signal out of limits.	Check device specific status and applied process value.

Table 42. Device Specific Transmitter Status

Message	Explanation	Recommended Action
Internal Calibration Failed	There was an error during the calibration procedure.	Perform calibration again.
Sensor signal exceeded	There were sensor signal peaks +/-150% of Nominal Range.	Check sensor.
Write EEPROM impossible	The EEPROM might be damaged.	Replace electronics.
PV out of sensor limits	PV was not within +/-110% of Nominal Range.	Check measuring.
Sensor temperature out of limits	Sensor temperature was out of limits.	Check sensor temperature.
Electronic temperature out of limits	The electronic temperature was outside the range of -40°C and +80°C.	Check electronics.
Measuring Range configuration invalid	Either the range configuration is out of sensor limits or the given range is smaller than the minimum span.	Correct range configuration.

Diagnostic Codes

In the Diagnostic Codes screen the various diagnostic codes are displayed in binary, hex, and decimal form with no text translation.

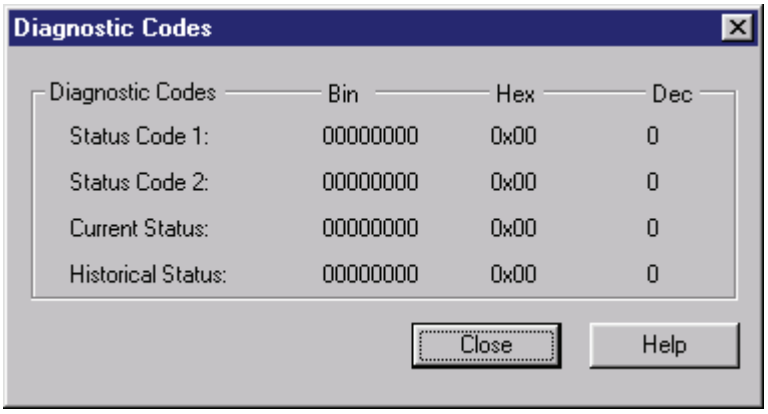


Figure L-9. Sample Diagnostic Codes Screen

Raw Input Value

The Raw Input Value screen shows the input signal coming from the pressure sensor in percent. It is accessed via the **Test** menu from the device top level menu.

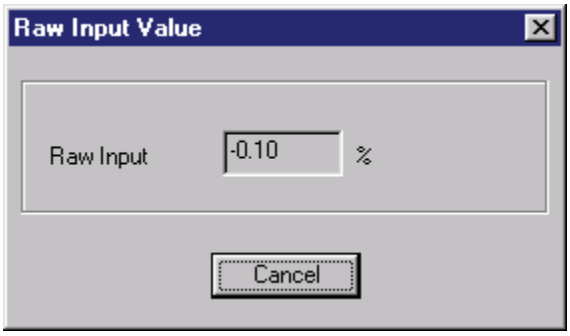


Figure L-10. Sample Raw Input Value Screen

Return from Fail-Safe State

This function clears a latched fail-safe state and returns the device to normal measurements and corresponding analog output if the reason for the fail-safe state is corrected. It is accessed via the **Test** menu from the device top level menu. It is only present if Reset Failsafe was configured as Manual.

Reset Change Flag

This function clears the Configuration Changed flag and the historical status information of the device. It is accessed via the **Test** menu from the device top level menu.

Master Reset

The execution of this function causes the transmitter to do a master reset. This takes about four seconds. During this time the device is not able to respond to any command until the execution is

complete and the transmitter latches the output on the last value. The Master Reset function is accessed via the **Test** menu from the device top level menu.

Write Protect

This function enables or disables write protection for the transmitter. If Write Protect is enabled, the transmitter is write protected and the inadvertent changing of transmitter configuration data is prevented.

Configuration

The Configuration function is accessed via the **Edit** menu from the device top level menu or from the Configuration icon on the device toolbar.

— NOTE

Whenever you change any configuration parameter and write the change to the transmitter, the Configuration Changed flag is set.

Identifier Tab Screen

The factory installed information on the transmitter, including the Device type, Serial Number, Sensor ID, Firmware and Hardware Version, Manufacturer, and Electronic ID, is not modifiable. Only Tag Number, Tag Name, Tag Date, and Message can be changed.

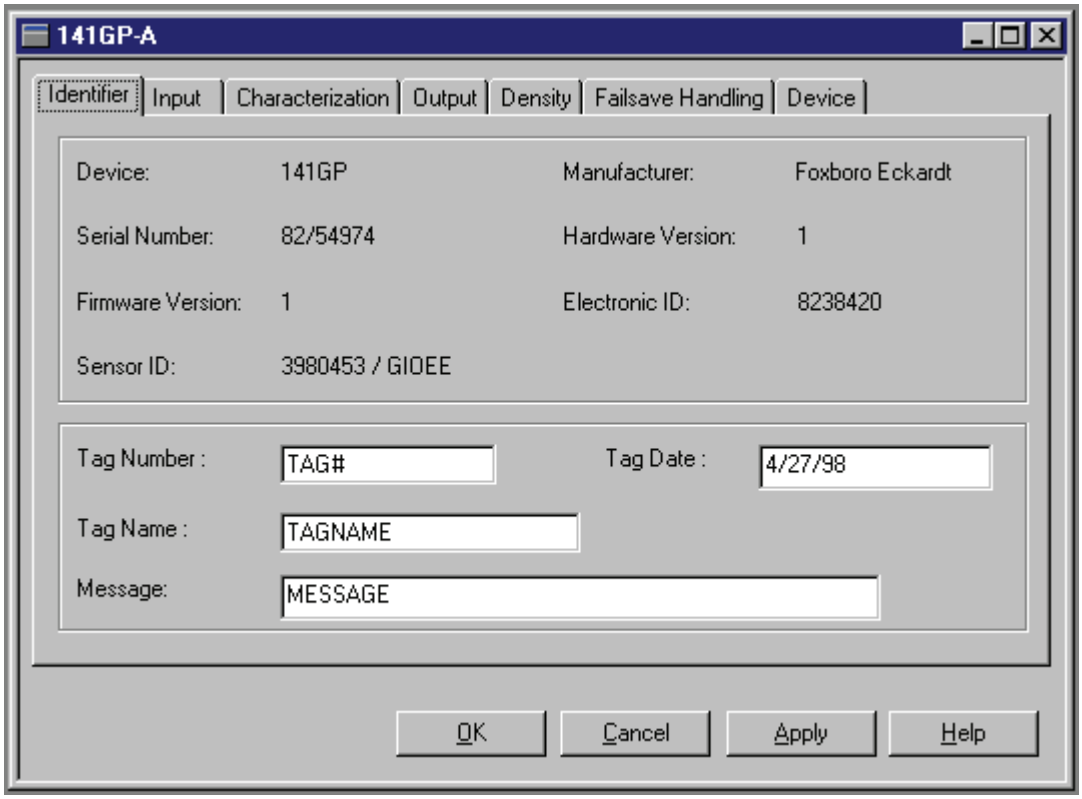


Figure L-11. Sample Identifier Tab Screen for a HART Transmitter

Field	Entry
Tag Number	Enter maximum of 8 characters. The Tag Number becomes the transmitter filename.
Tag Name	Enter maximum of 16 characters. Optional, used for reference only.
Tag Date	Enter a date. It is possible to enter any valid future or past date. This field may be used for storing the last calibration or maintenance date.
Message	Enter maximum of 32 characters. Optional, used for company internal designations, device numbers for material industry (business), final alignment of the device, startup of the device, or any other purpose.

— NOTE

Only capital letters can be used. No special symbols can be used.

Input Tab Screen / Profibus PV Tab Screen

The Input tab screen (see Figure L-13) and Profibus PV tab screen (see Figure L-12) are very similar. For FoxCom and HART devices, the Input tab screen is used. The Profibus device uses the PV tab screen. The Profibus PV tab screen contains some additional features which are described at the end of this chapter. Both tabs show the relevant information for the sensor input (Device Type, Measurement Task, and maximum Span Limit). The equivalent value and unit for the Span Limit may be entered here.

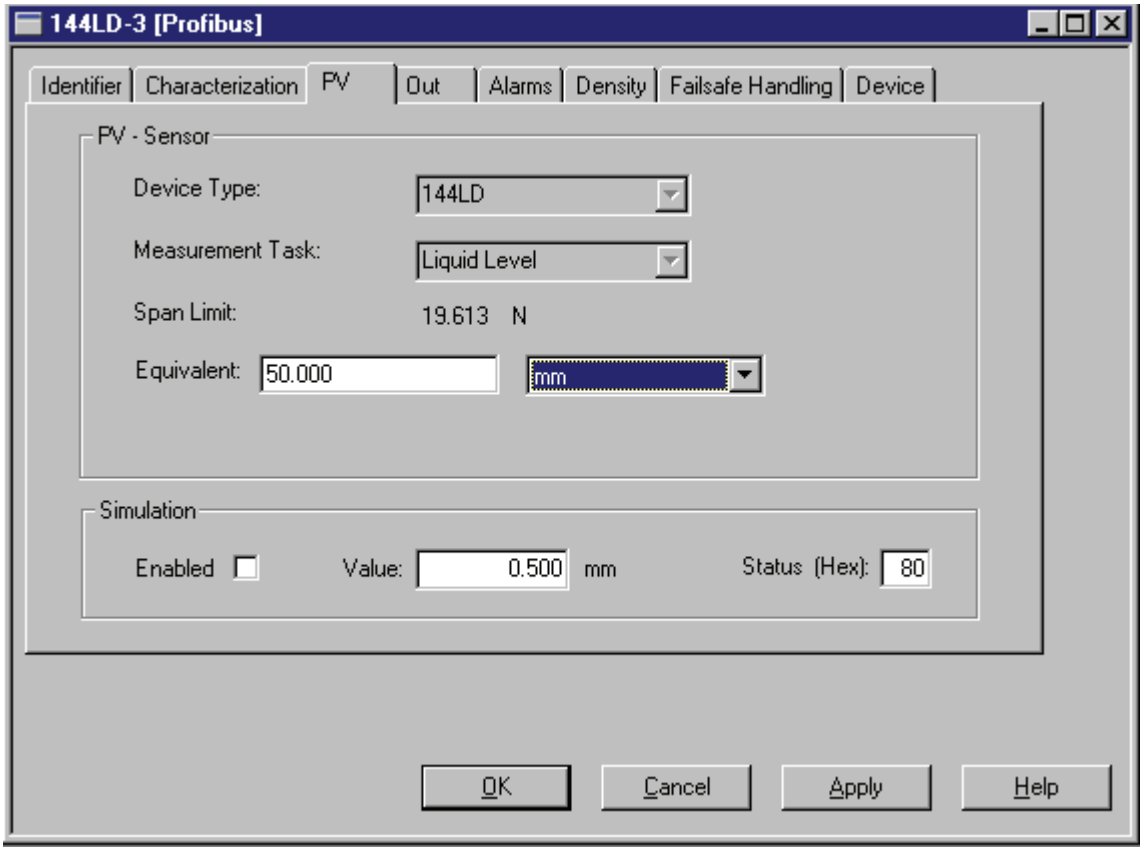


Figure L-12. Sample Profibus PV Tab Screen

The PV unit is centrally assigned for the complete device and is automatically displayed in the Output screen according to the defined values. When a different pressure unit (for FoxCom or HART device) is selected, a recalculation of the corresponding values in the Output tab screen fields for **Lower Range Value**, **Upper Range Value**, and **Upper Range Limit** is also done. For the Profibus Level device, the recalculation is only done between the length or volume units.

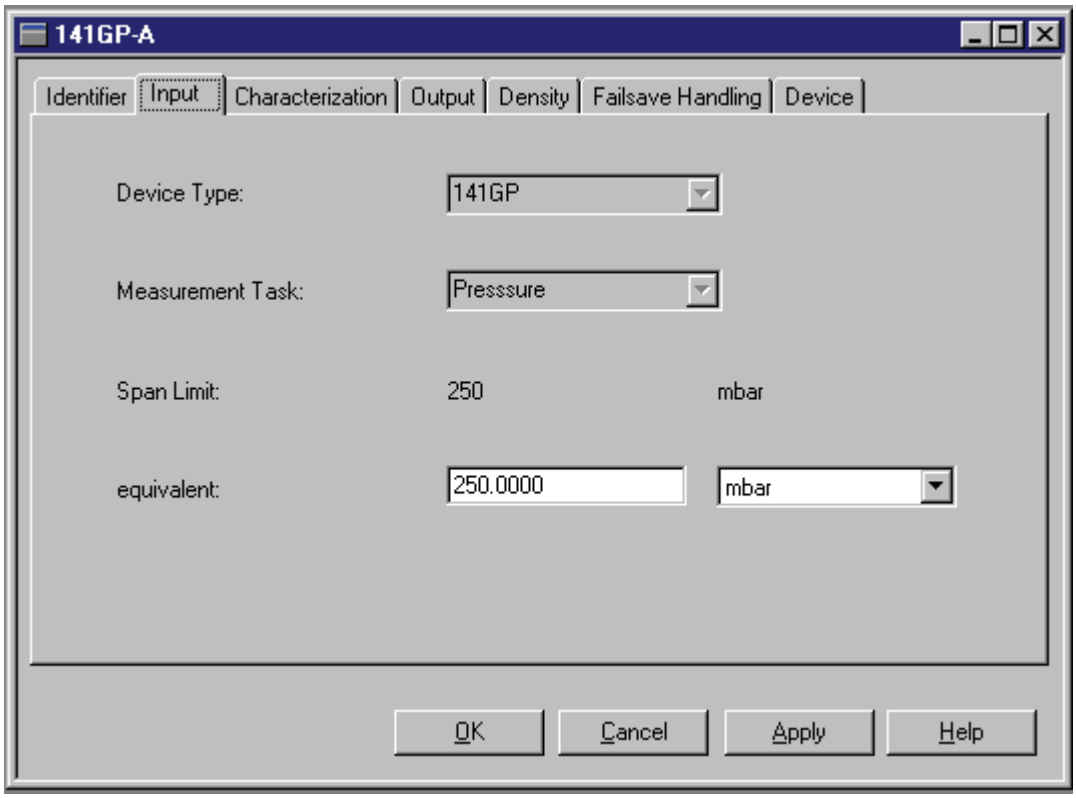


Figure L-13. Sample Input Tab Screen

Device Type

Device Type shows the first part of the Model Code of the transmitter.

Measurement Task

The Measurement Task of the transmitter is displayed. The different measurement tasks are: Pressure, Differential Pressure, Flow, Liquid Level, Liquid Interface, Liquid Density, or Special.

Span Limit

The maximum Span Limit and unit of the device type is displayed. This is specific for the transmitter and cannot be changed.

Equivalent

In the second equivalent field, a different unit for the primary variable (PV Unit) can be specified. You can select from the menu of choices or, if the required unit is not on the list, select **Special.** When a different unit is selected, a recalculation of the corresponding value in the first field is done. If **Special** is selected, a new **Custom Unit** field appears in which a unit can be freely defined with a maximum of seven characters. In this case, you must define a conversion as follows:

Example 1: The upper sensor limit of 2.5 bar corresponds to a level of 6 m in the desired application. Enter for equivalent **6** and for unit **meter**.

Example 2: If you configure a square root characteristic in order to measure flow, calculate the Upper Range Limit (URL) in flow units using the formula:

URL = SQR(nominal_range/URV) * URV(q)

with:

- Nominal range in pressure units
- URV: differential pressure URV in pressure units
- URV(q): upper range value in flow units.

CAUTION

Always check the calculation of your conversion.

The PV Unit is centrally assigned for the complete device and is automatically displayed in the Output screen according to the defined values. When a different pressure unit is selected, a recalculation of the corresponding values in the Output Tab screen fields for Lower Range Value, Upper Range Value, and Upper Range Limit is also done. For the Profibus Level device the recalculation is only done between the length or volume units.

The Profibus device has the following additional features:

For commissioning and test purposes, it is possible for the Profibus device to simulate the PV value and status. If simulation is enabled by checking the Enable check box, the Transducer block and the Analog Input Function block (AI-FB) will be disconnected within the device. Then the input and status values from the Transducer block in the AI-FB can be modified. After checking the **Enable** box enter the PV **Value** and **Status** for simulation.

Characterization Tab Screen

This screen enables a selection of a transformation function of the input signal. The choices are Linear (Range +/- 110%), Square Root, and Custom Curve.

Square Root is intended for flow measurements. It includes a suppressed zero range of 7% of the output range. Flow can be represented in flow units.

Custom Curve allows a specified characteristic consisting of up to 32 points (X/Y pairs) to be entered. The input values (X-Values) are sorted in increasing order.

A customized characteristic which is stored in the device can be activated by selecting Custom Curve or deactivated by switching to Linear or Square Root.

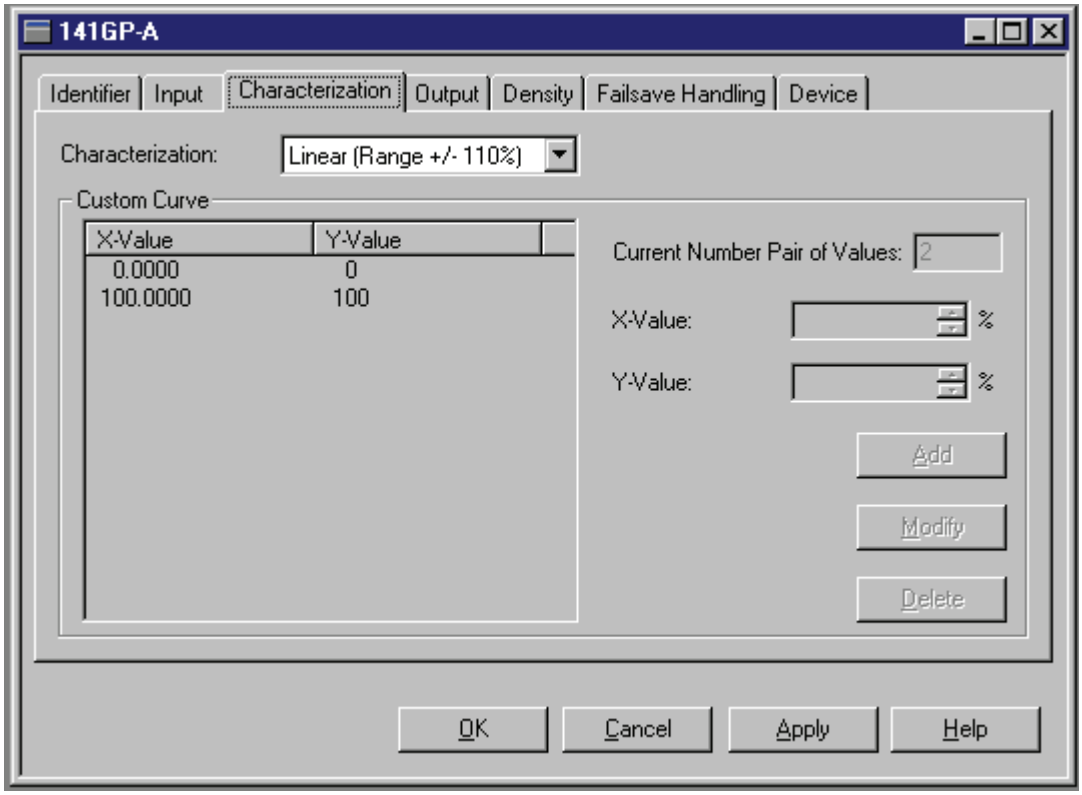


Figure L-14. Sample Characterization Tab Screen

Output Tab Screen

The Output tab screen allows the configuration of the output signal. This includes the selection of:

- The transfer function for the output (linear or square root)
- Reranging by selecting the Lower and Upper Range Values
- The output damping value
- The output mode.

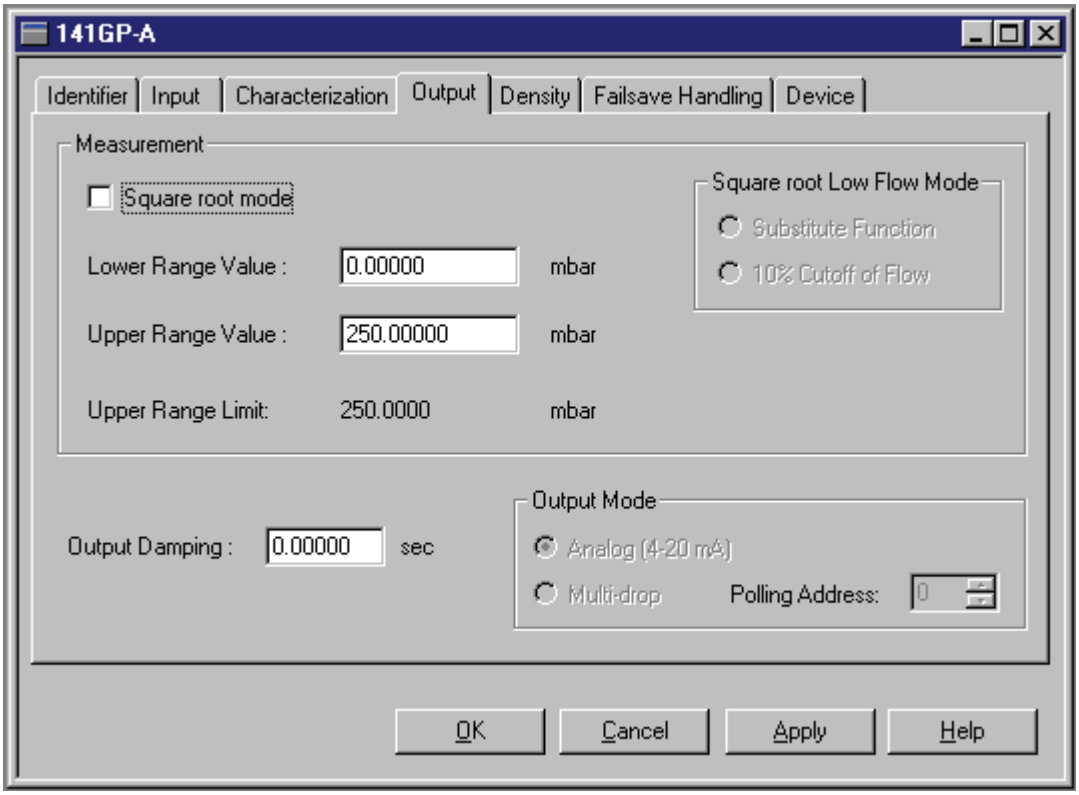


Figure L-15. Sample Output Tab Screen

Square Root Mode

The transfer function of the analog output can either be linear or square root. If the Square root mode check box is activated, the transfer function is square root. A suppressed zero range is activated automatically with the square root function. The selected analog output transfer function has **no** effect on the measurement of the PV.

Lower and Upper Range Value

Changing the Lower Range Value (LRV) and the Upper Range Value (URV) allocates a section from the nominal range to the signal range 4 to 20 mA via the measuring range. Both the Lower Range Value and the Upper Range Value must be numerical values within the nominal range of the sensor.

Output Damping

Damping values between 0 and 32 seconds can be entered. The adjustable damping corresponds to the 63% value.

Output Mode

It is possible to change the Output Mode between Analog (4 - 20 mA) and Multi-drop for HART devices and between Analog (4 - 20 mA) and Digital for FoxCom devices. If Multi-drop is selected, the Polling Address must be set between 1 and 15. In Multi-drop mode, the analog

output is frozen at 4 mA. IFDC/PC20 is able to connect and communicate with a transmitter that is in Multi-drop mode, but only with one of them connected to the modem at a time.

Profibus Out Tab Screen

The Out tab screen for the Profibus devices allows the configuration of the out signal. The out signal is defined in three steps:

- Define the Lower and Upper Range Values of the Out signal in Units of PV (on the left side)
- On the right side of the screen specify an equivalent representation of the signal from step 1 as Out signal:
  - Equivalent Unit of the Out signal
  - Value of the Equivalent to the Upper Range Value in Units of the Out signal
  - Value of the Equivalent to the Lower Range Value in Units of the Out signal
  - Number of Decimal Points for the representation of the Out signal.
- Define the Out signal characteristics:
  - The Filter Time (output damping value)
  - The Target Mode: Defines the desired mode.

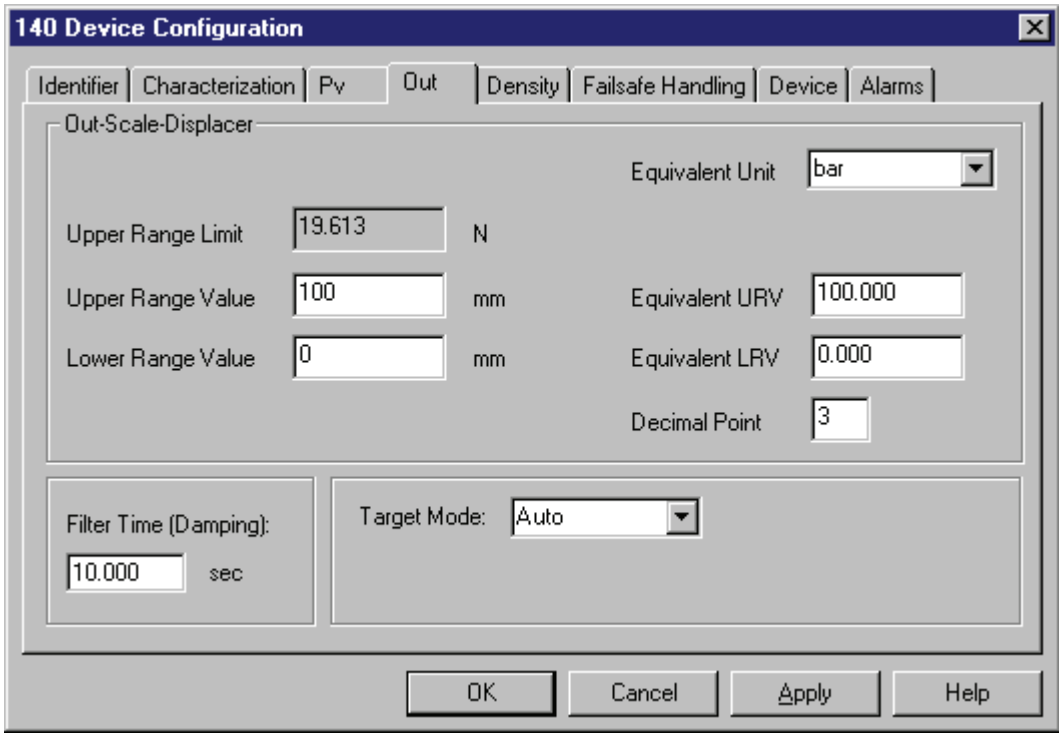


Figure L-16. Sample Profibus Out Tab Screen

Density Tab Screen

Density information can be displayed and entered for certain device types. This information is stored in the transmitter.

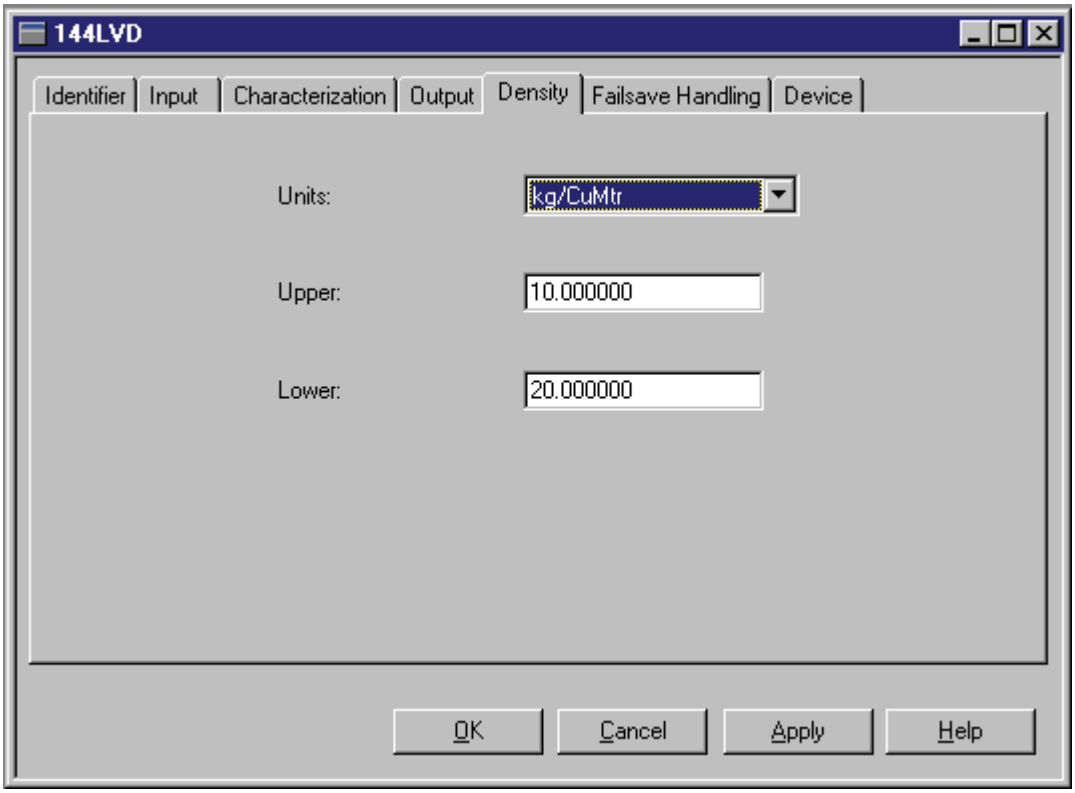


Figure L-17. Sample Density Tab Screen

Failsafe Handling Tab Screen

The 140 Series has an extensive fail-safe management. With the Failsafe Handling screen, it is possible to configure which errors will cause the device to go into the fail-safe state, which mA value will be set on the output when it is in the fail-safe state, and how the device should return from fail-safe (automatic or by command item Return from Failsafe).

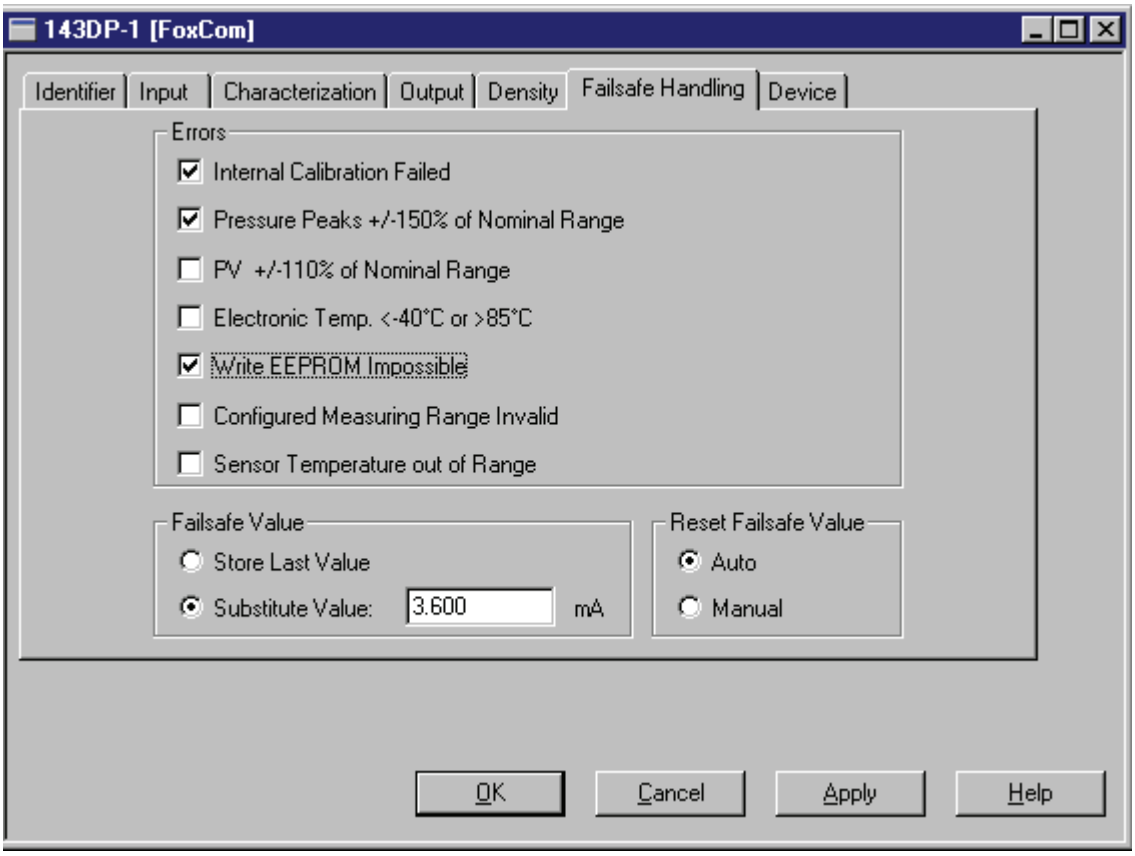


Figure L-18. Sample Failsafe Handling Tab Screen

Errors

By checking the different check boxes, you can configure which errors will bring the transmitter into the fail-safe mode. If this box is not checked, a disturbance does not affect the analog output.

Failsafe Value

In this area, you can specify whether, in a fail-safe situation, the analog output is latched at the last valid value or set to a value specified between 3.6 and 23 mA.

Reset Failsafe Value

In this area, you can specify the manner in which to reset fail-safe after a fail-safe condition is corrected.

Selecting Auto automatically clears the latched fail-safe state and returns to normal measuring and corresponding analog output when the reason for the fail-safe state is corrected.

Selecting Manual requires you to manually clear the fail-safe state via the Return from Failsafe function.

Device Tab Screen

In this screen, the local display and keys may be configured.

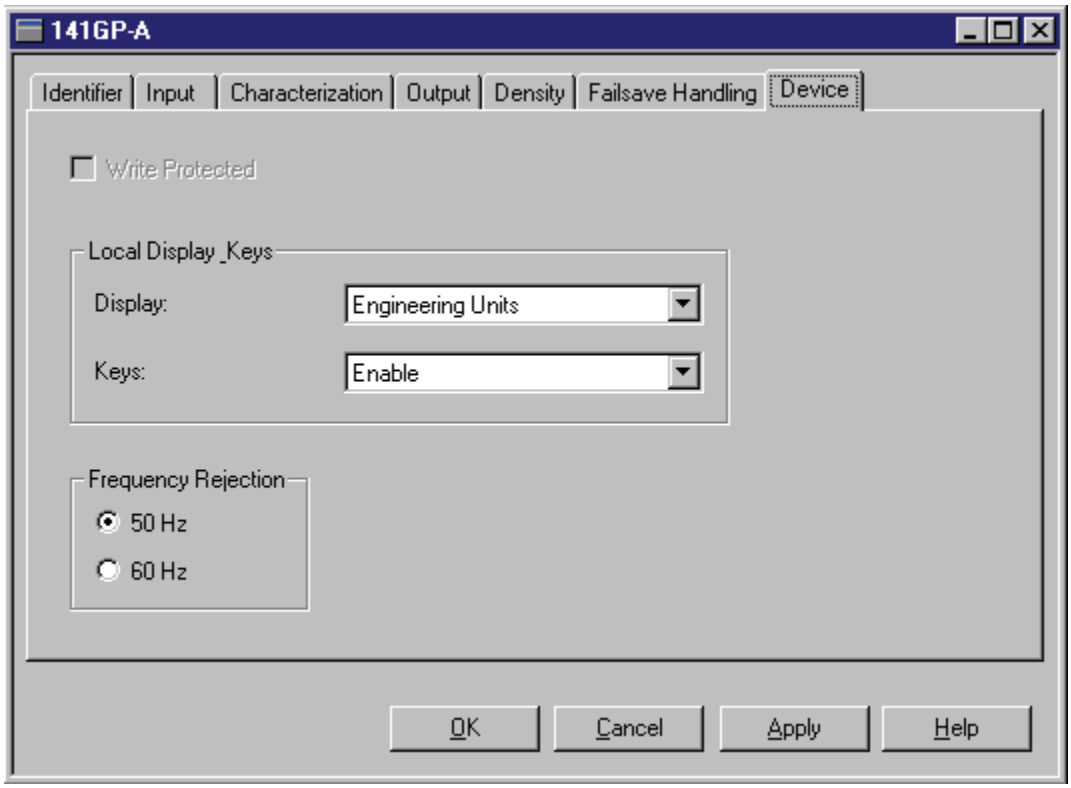


Figure L-19. Sample Device Tab Screen

If the **Write Protected** box is checked, the transmitter is write protected and the inadvertent changing of the transmitter configuration is prevented.

There is an option of displaying the measured value on the local indicator of the transmitter. With the Display selection, you can specify whether the indicator displays the measured value in the standard or user-defined special units (Engineering Units) or displays the analog output in mA (Analog Output) or as 0 to 100% (Percent of Range). If a local indicator is not used, configure None.

The Keys selection controls the possibility of enabling and disabling the keys for URV and LRV independently of each other. This prevents unintentional change of URV and LRV. The Damping and Zero trim functions are always active via the keys.

With Frequency Rejection, it is possible to adapt the trouble suppression to the line frequency.

Profibus Alarms Tab Screen

For a Profibus device, it is possible to define alarm conditions for the Out signal. Four alarms can be defined:

Field	Entry
Hystheresis	When a measurement value is residing around a measurement limit (that is, HIGH Data Limit) it is possible that the alarm indicator will trigger excessively as the value drifts above and below the limit. To prevent this from occurring a Hysteresis parameter is introduced. This parameter which is defined in % of measurement span, allows the measurement value to pass through the trigger value but requires the measurement value to change (%*span) in the opposite direction before the trigger is released. The Hysteresis algorithm is applied to all alarm triggers and the Hysteresis % value is user configurable.
High High Alarm	Value for upper limit alarms: Upper limit value for alarms with engineering unit of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the State Byte of OUT and in the Function Block parameter ALARM_SUM have to change to 1. The unit of this parameter is the same as the OUT one.
High Alarm	Value for upper limit warnings: Upper limit value for warnings with engineering unit of the OUT parameter. If the measured variable is equal to or higher than the upper limit value, the State Bits in the State Byte of OUT and in the Function Block parameter ALARM_SUM have to change to 1. The unit of this parameter is the same as the OUT one.
Low Alarm	Value for lower limit warnings: Lower limit value for warnings with engineering unit of the OUT parameter. If the measured variable is equal to or lower than the lower limit value, the State Bits in the State Byte of OUT and in the Function Block parameter ALARM_SUM have to change to 1. The unit of this parameter is the same as the OUT one.
Low Low Alarm	Value for lower limit alarms: Lower limit value for alarms with engineering unit of the OUT parameter. If the measured variable is equal to or lower than the upper limit value the State Bits in the State Byte of OUT and in the Function Block parameter ALARM_SUM must change to 1. The unit of this parameter is the same as the OUT one.

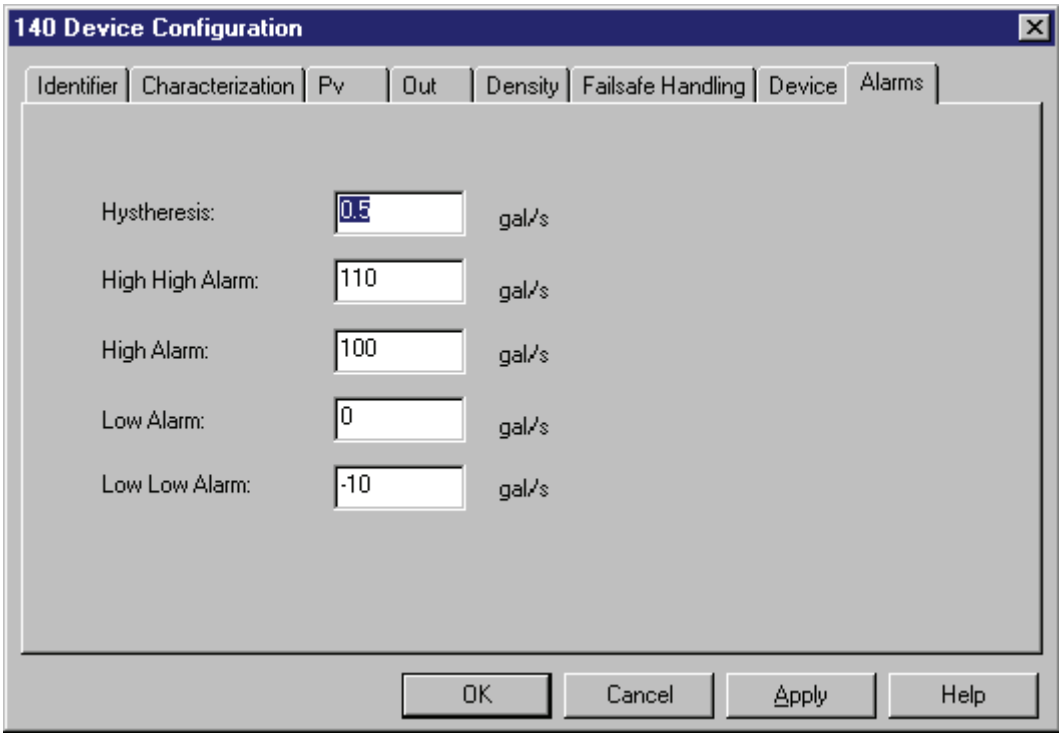


Figure L-20. Sample Profibus Alarms Tab Screen

Calibration

— NOTE

Whenever you perform any calibration, the Configuration Changed flag is set.

ReZero

This function enables you to adjust the zero offset of the pressure sensor. The compensation value of the zero offset of the sensor is displayed in percent. It is accessed via the **Calibration** menu from the device top level menu.

— NOTE

Since the damping is active, the delay time must be observed or damping must be reduced to 0 seconds during the calibration procedure.

The sensors for pressure and differential pressure can be calibrated by venting (for example, at the valve block). For buoyancy level transmitters, apply the displacer (or a corresponding weight) and ReZero the device. The signal range of the sensors is 0 to 10 mV. The displayed physical Zero value shows the active correction factor in %.

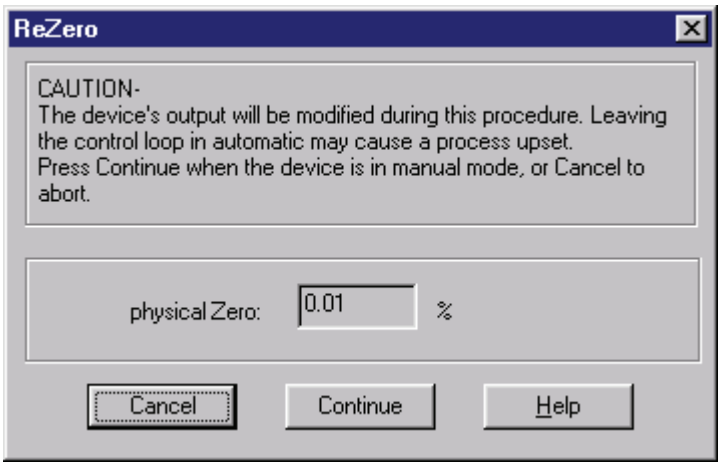

ReZero
CAUTION-
The device's output will be modified during this procedure. Leaving the control loop in automatic may cause a process upset.
Press Continue when the device is in manual mode, or Cancel to abort.
physical Zero:
0.01
%
Cancel
Continue
Help

Figure L-21. Sample ReZero Calibration Screen

Point Calibration

This function enables you to calibrate the transmitter to your standards by applying reference values to the input.

NOTE

Calibration of the lower point does not affect span. Calibration of the upper point does not affect zero.

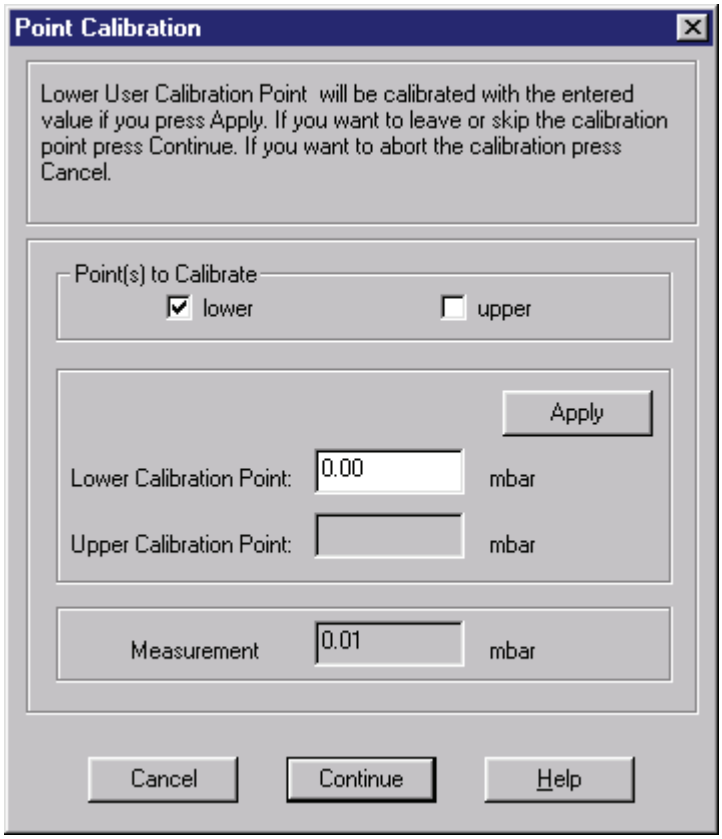


Figure L-22. Sample Point Calibration Screen

1. Select **Point Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. To calibrate the lower point, under **Point to Calibrate**, select **lower**.
4. Apply the lower calibration point pressure to the input.
5. When the displayed measurement is stable, enter your desired lower calibration point and select **Apply**.
6. To calibrate the upper point, perform Steps 3 through 5 applying the upper calibration point pressure and entering the upper calibration point.
7. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

This procedure adjusts the 4 to 20mA output signal of the transmitter.

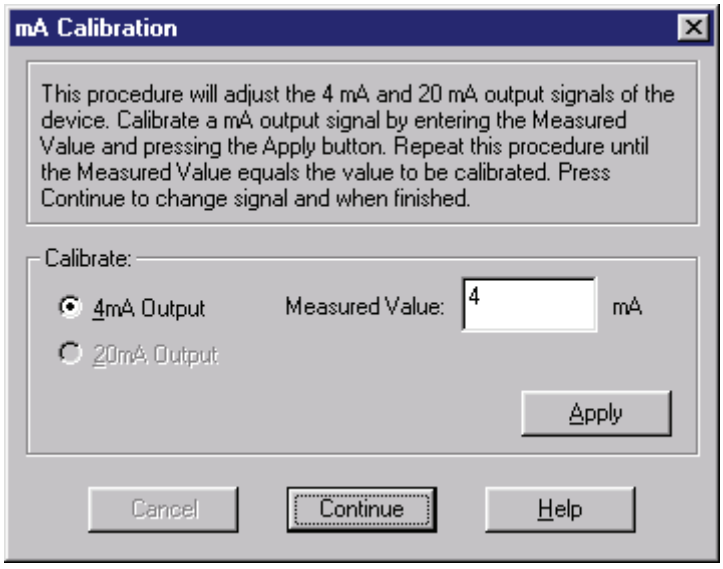

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by entering the Measured Value and pressing the Apply button. Repeat this procedure until the Measured Value equals the value to be calibrated. Press Continue to change signal and when finished.
Calibrate:
4mA Output
Measured Value:
4
mA
20mA Output
Apply
Cancel
Continue
Help

Figure L-23. Sample mA Calibration Screen

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device. To do this, insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring. Perform the following procedure:

1. Select **mA Calibration** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **4 mA Output**.
4. Enter the value from the mA meter in the **Measured Value** field on your screen and select **Apply**.
5. Repeat Step 4 until the **Measured Value** equals the value on the meter.
6. Select **20 mA Output**.
7. Repeat Steps 4 and 5.
8. Select **Continue** to save the calibration to the transmitter.
9. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Factory Calibration

This function changes the corrected values for the sensor trim done by Point Calibration back to their default values. It is accessed via the **Calibration** menu from the device top level menu.

Specification

Sensor Tab Screen

The Sensor Tab screen displays sensor specific information which is stored in the transmitter. It is accessed via the **View** menu from the device top level menu.

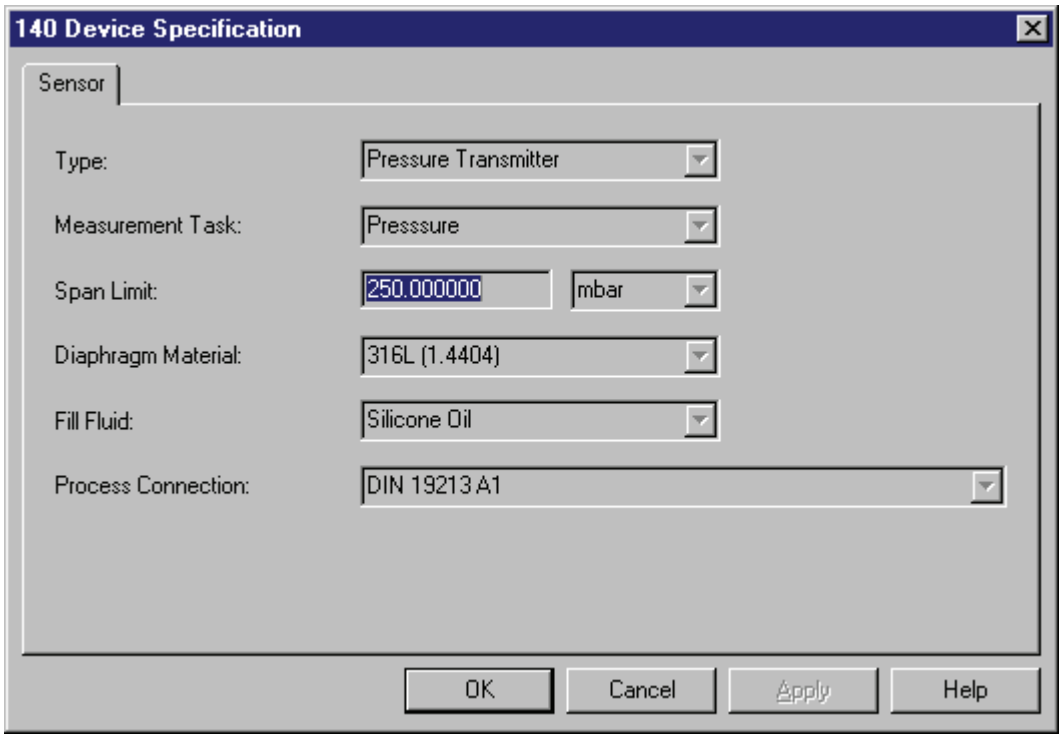


Figure L-24. Sample Specification Sensor Tab Screen

Displacer Tab Screen

The Displacer Tab screen is only displayed for the 144LVD and 144LD devices. The screen displays displacer specific information which is stored in the transmitter. It is accessed via the **View** menu from the device top level menu.

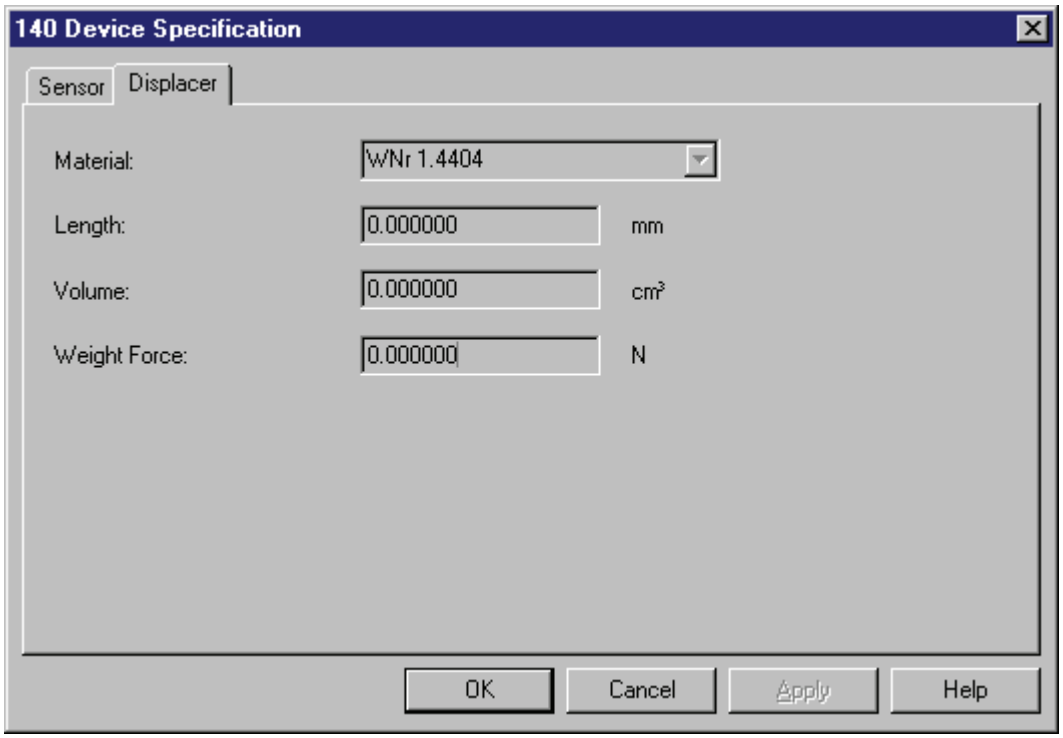


Figure L-25. Sample Specification Displacer Tab Screen

Appendix M. 870ITCR Conductivity/Resistivity Transmitters

This appendix provides information that is exclusive to the 870ITCR transmitters in regards to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Error Messages
- Calibration
- Configuration
- Database Report.

Device Data Screen

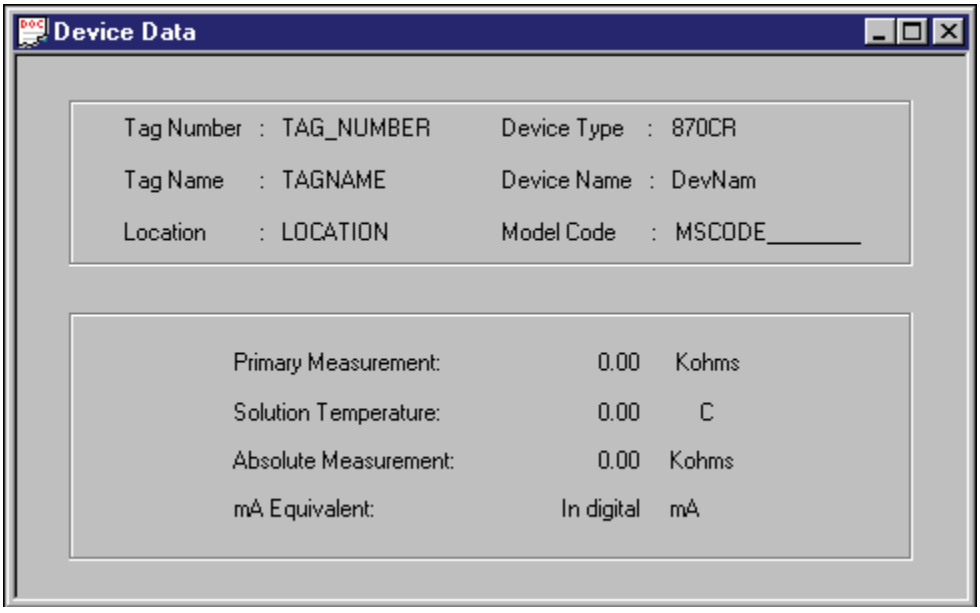


Figure M-1. Sample 870ITCR Device Data Screen

Error Messages

Table 43. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Transmitter is reinitializing on reset.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See diagnostic error message to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Measurement Error	Unstable process measurement.	Check sensor connection. **Select Test > Go On-Line**. If this does not clear problem, contact the CSC.
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Bad Message Received	Transmitter received a bad message.	Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Stability Error	Raw measurement has been unstable.	Check wiring. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Probe Error	Problem with the sensor.	Replace sensor.
Temp Comp Error	Problem in temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Amplifier Error	Out-of-range error.	Check sensor. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Extended Status - Hardware		
ATC Open	Resistance of temperature compensation is greater or less than expected resistance of device configured.	Replace temperature compensator.
ATC Short		
Leak Error	Solution leakage into sensor.	Replace sensor.
App1 Cal Req	Application 1 calibration required.	Calibrate.
App2 Cal Req	Application 2 calibration required.	Calibrate.

Table 43. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
App3 Cal Req	Application 3 calibration required.	Calibrate.
Cal Comp Error	Indicates a problem in the previous calibration.	Recalibrate the transmitter. If problem persists, contact the CSC.
Cal Slope Error	A slope error has occurred as the result of the previous calibration.	Check sensor and recalibrate transmitter. If the problem persists, contact the CSC.
RTD Cal Tolerance	RTD calibration is not within tolerance.	Recalibrate the RTD. If problem persists, contact the CSC.
Therm Cal Tolerance	Thermistor calibration is not within tolerance.	Recalibrate the thermistor. If problem persists, contact the CSC.
Tune Stability	Calibration measurement not stabilized.	Check stability configuration or replace sensor.
Amp Failure	Overrange condition on raw measurement.	Check sensor and transmitter connections. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Extended Status - Process		
mA Under Range	Measurement under or over configured range.	Reconfigure range or correct process error.
mA Over Range		
Comp Under Range	Measurement under or over compensation range.	Reconfigure compensation or correct process error.
Comp Over Range		
Disp Under Range	Primary measurement is too low or too high.	Check sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Disp Over Range		
Unstable Temp	Unstable temperature measurement.	Check ATC connection. Verify process temperature. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Unstable Meas	Unstable process measurement.	Check measurement sensor connection. Select **Test > Go On-Line**. If this does not clear problem, contact the CSC.

Calibration

You can perform the following calibration procedures on an 870ITCR transmitter using the Intelligent Field Device Configurator:

- Bench Calibration
- Calibration Pure H2O
- Solution 1-Point Offset
- Solution 1-Point Span
- Solution 2-Point

- Temperature Sensor
- mA Calibration.

Bench Calibration

You can perform a bench calibration for either conductivity or resistivity measurements by connecting your own discrete components to the transmitter.

1. Select the application to be calibrated from the Sensor screen in the Configuration function. See page 295.
2. Select **Bench Calibration** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Enter the calibrator's initials, and select **Continue**.
5. Wait while the device is reinitializing.
6. Follow the prompt to connect Resistor 1 between terminals 1B and 1E and select **Continue**.
7. Wait while the device is calibrating.
8. Follow the prompt to connect Resistor 2 or the specified capacitor in place of Resistor 1 and select **Continue**.
9. Wait while the device is calibrating. The current calibration date is automatically updated.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Calibration Pure H2O

If you are measuring purity of water by checking the conductivity in µS/cm or resistivity in MΩ•cm with an 871CR-A or 871CR-B sensor, you can use this calibration.

1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 295.
2. Select **Calibration Pure H2O** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Enter the temperature cell factor (tCF) and cell factor (CF) found on your sensor. Also enter the calibrator's initials and select **Continue**.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Offset

This option permits you to set a 1-point offset for up to three applications and is normally used to correct for zero shift. This should be used only if you have previously performed a 2-point calibration.

1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 295.
2. Select **Solution 1-Point Offset** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

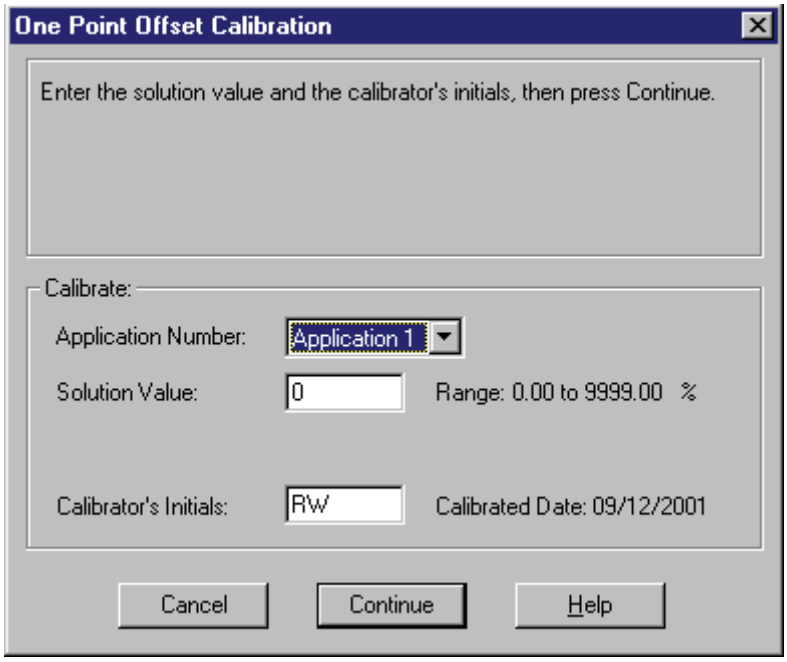


Figure M-2. Sample 870ITCR Solution 1-Point Offset Screen

4. Enter the solution value and the calibrator's initials, and select **Continue**.
5. Wait while the device is reinitializing.
6. Immerse the sensor in the solution and select **Continue**.
7. Wait while the device is calibrating. The current calibration date is automatically updated.
8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 1-Point Span

This option permits you to set a calibration point (1-point span) for up to three applications. This is usually done to correct for a cell factor change due to installation. It should be used only if you have previously performed a 2-point calibration. The point selected should be at the high end of the measurement range.

1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 295.
2. Select **Solution 1-Point Span** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

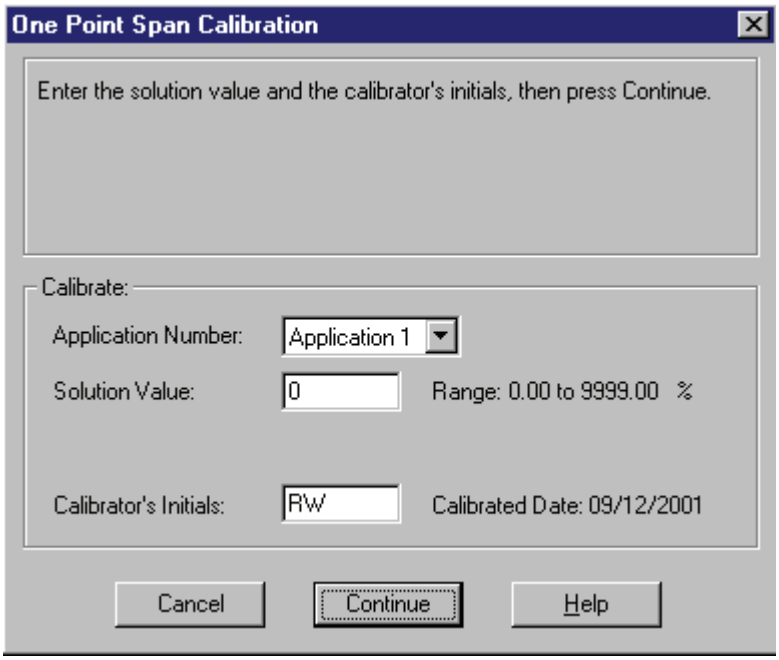


Figure M-3. Sample 870ITCR Solution 1-Point Span Screen

4. Enter the solution value and the calibrator's initials, and select **Continue**.
5. Wait while the device is reinitializing.
6. Immerse the sensor in the solution and select **Continue**.
7. Wait while the device is calibrating. The current calibration date is automatically updated.
8. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Solution 2-Point

This option permits you to perform a 2-point calibration for up to three applications.

1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 295.
2. Select **Solution 2-Point** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

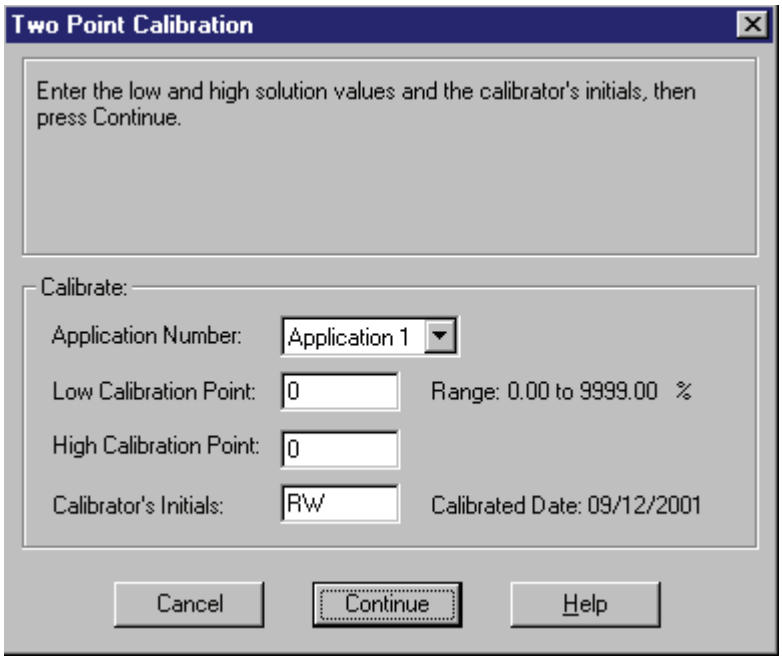


Figure M-4. Sample 870ITCR Solution 2-Point Calibration Screen

4. Enter the low and high solution values and the calibrator's initials, and select **Continue**.
5. Wait while the device is reinitializing.
6. Immerse the sensor in the low calibration solution and select **Continue**.
7. Wait while the device is calibrating.
8. Immerse the sensor in the high calibration solution and select **Continue**.
9. Wait while the device is calibrating. The current calibration date is automatically updated.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Temperature Sensor

This option permits you to calibrate the temperature sensor to the known temperature of a solution.

1. Select the application to be calibrated from the Sensor Tab screen in the Configuration function. See page 295.
2. Select **Temperature Sensor** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.

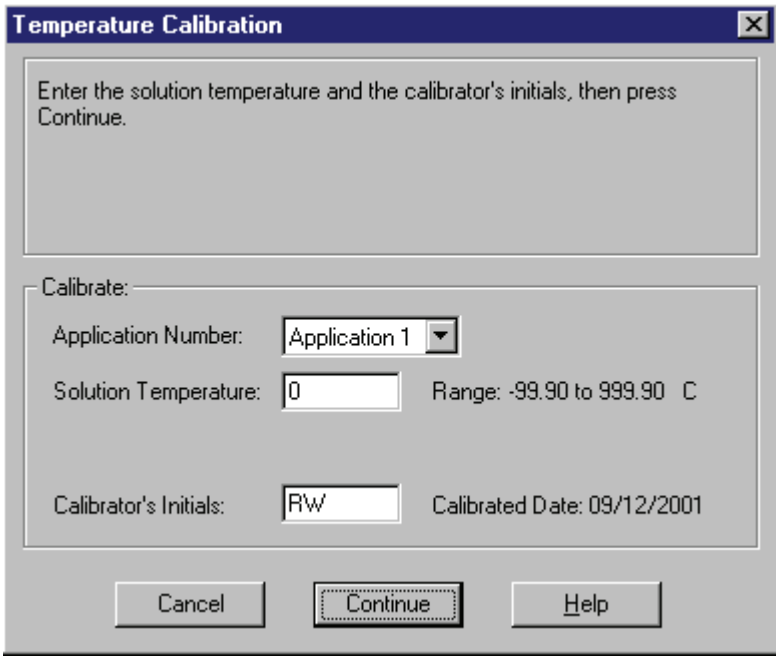


Figure M-5. Sample 870ITCR Temperature Calibration

4. Enter the solution temperature and the calibrator's initials, and select **Continue**.
5. Immerse the sensor in the solution and select **Continue**.
6. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

mA Calibration

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Output** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.
5. Set the **Step Size** (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.

9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

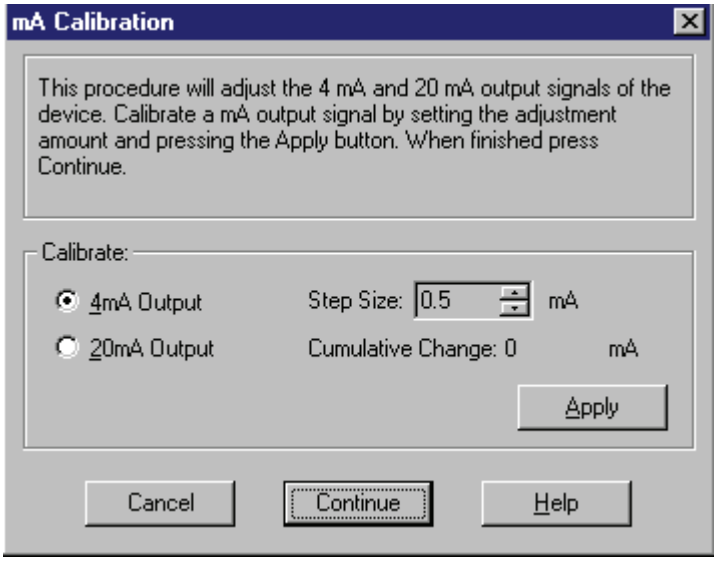

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure M-6. Sample 870ITCR mA Calibration Screen

Configuration

Identifier Tab Screen

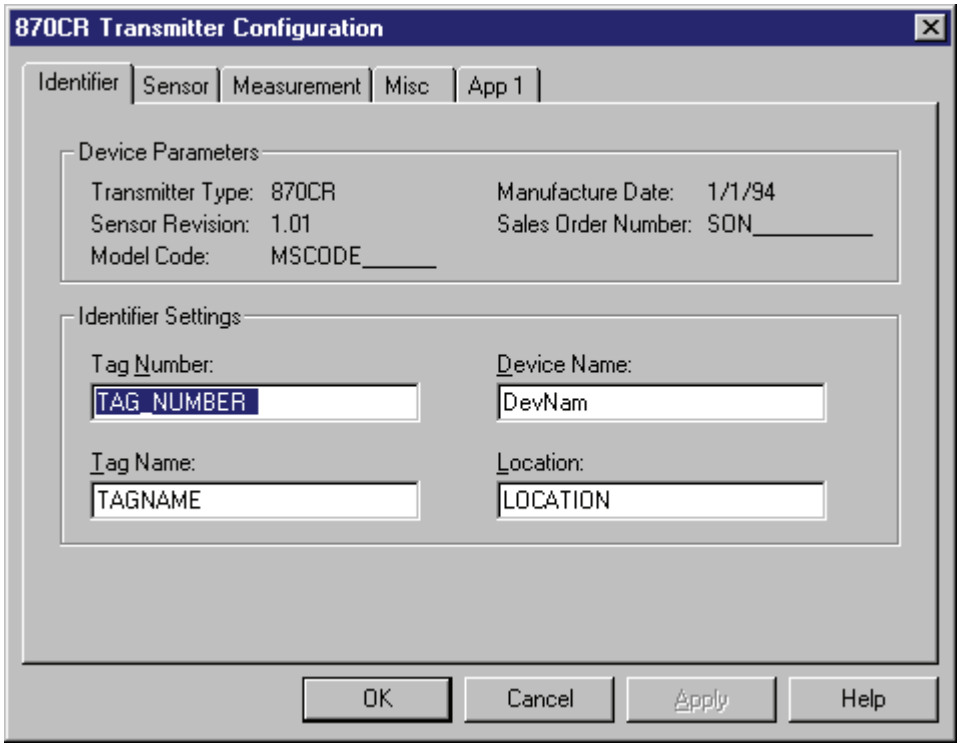


Figure M-7. Sample 870ITCR Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Sensor Tab Screen

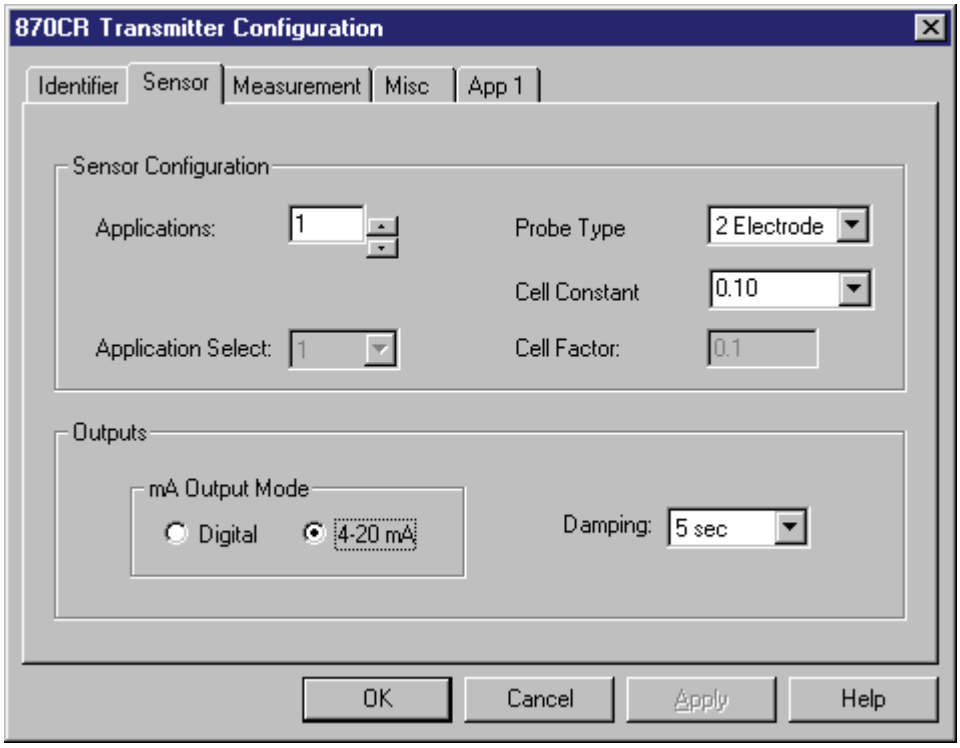


Figure M-8. Sample 870ITCR Sensor Tab Screen

Field	Entry
Sensor Configuration	
Applications	Number of applications to be configured. Select **1, 2,** or **3** applications.
Application Select	Select **1**, **2**, **3**, or **AUTO**.
Probe Type	Specify **2 Electrode**.
Cell Constant	Specify **0.1**, **10**, or **Other**.
Cell Factor	If sensor type is **Other**, specify cell factor between 00.00 and 99.99.
Outputs	
mA Output Mode	Select **Digital** or **4-20 mA**.
Damping	Select damping response time of **1**, **5**, **10**, **20**, **40**, or **120** seconds.

Measurement Tab Screen

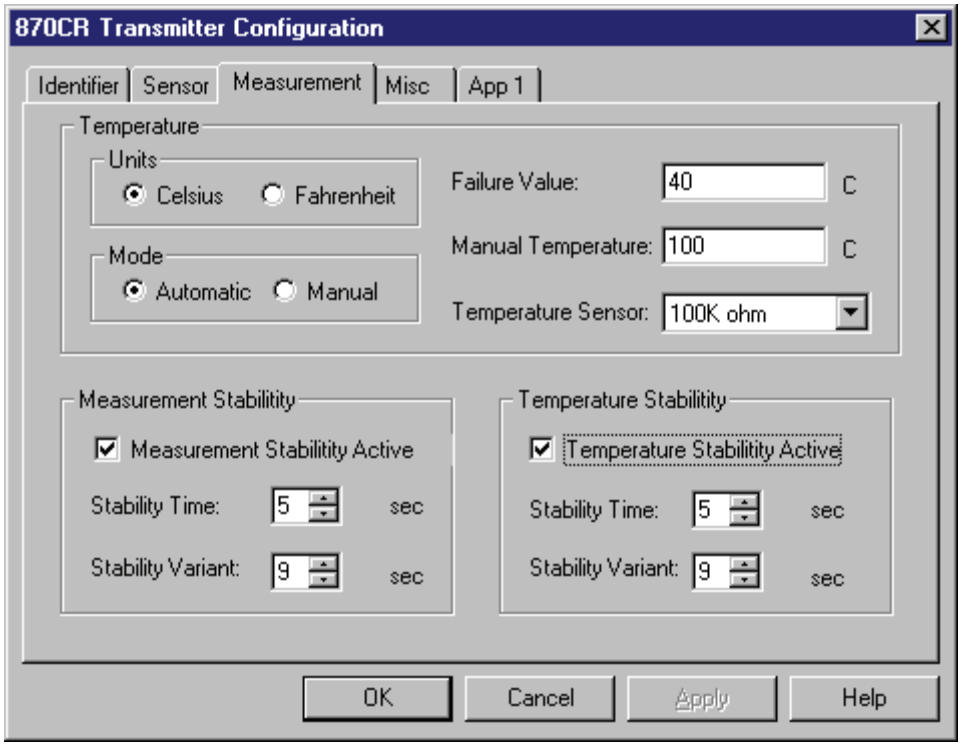


Figure M-9. Sample 870ITCR Measurement Tab Screen

Field	Entry
Temperature	
Units	Select **Celsius** or **Fahrenheit**
Mode	Select **Automatic** (follows RTD) or **Manual** (fixed point).
Failure Value	If **Mode** is **Automatic**, enter temperature in case RTD fails.
Manual Temperature	If **Mode** is **Manual**, enter temperature.
Temperature Sensor	Select **2-wire 100 Ω**, **2-wire 1000 Ω**, **3-wire 100 Ω**, or **3-wire 1000 Ω RTD**, or **100 kΩ thermistor**.
Measurement Stability	
Measurement Stability Active	√ = Instrument Stability Measurement Feature On; Blank = Instrument Stability Measurement Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.
Stability Variant	If on, enter variant between 1 and 9.
Temperature Stability	
Temperature Stability Active	√ = Instrument Stability Temperature Feature On; Blank = Instrument Stability Temperature Feature Off
Stability Time	If on, enter time between 5 and 60 seconds in 5-second increments.

Field	Entry
Stability Variant	If on, enter variant between 1 and 9.

Misc Tab Screen

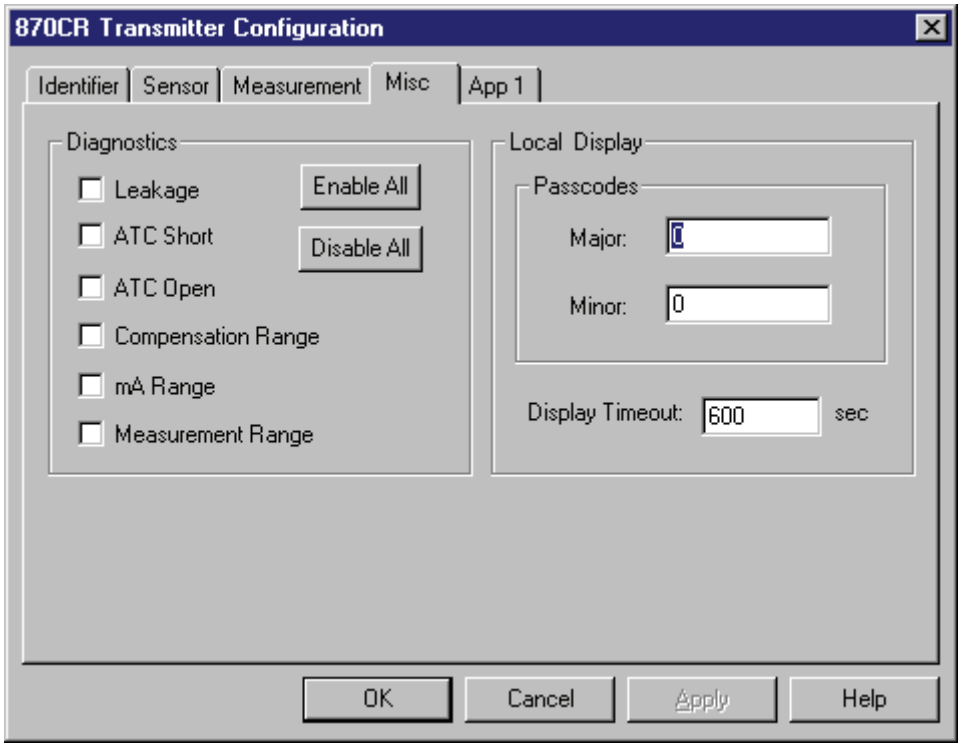


Figure M-10. Sample 870ITCR Misc Tab Screen

Field	Entry
Diagnostics	
Leakage	√ = Enable error messages; Blank = Disable error messages
ATC Short	
ATC Open	
Compensation Range	
mA Range	
Measurement Range	
Enable All	Enables all messages listed above.
Disable All	Disables all messages listed above.
Local Display	
Major Passcode	Enter 4-digit passcode.
Minor Passcode	Enter 4-digit passcode.
Display Timeout	Enter timeout between 0 and 999 seconds.

Application Tab Screen

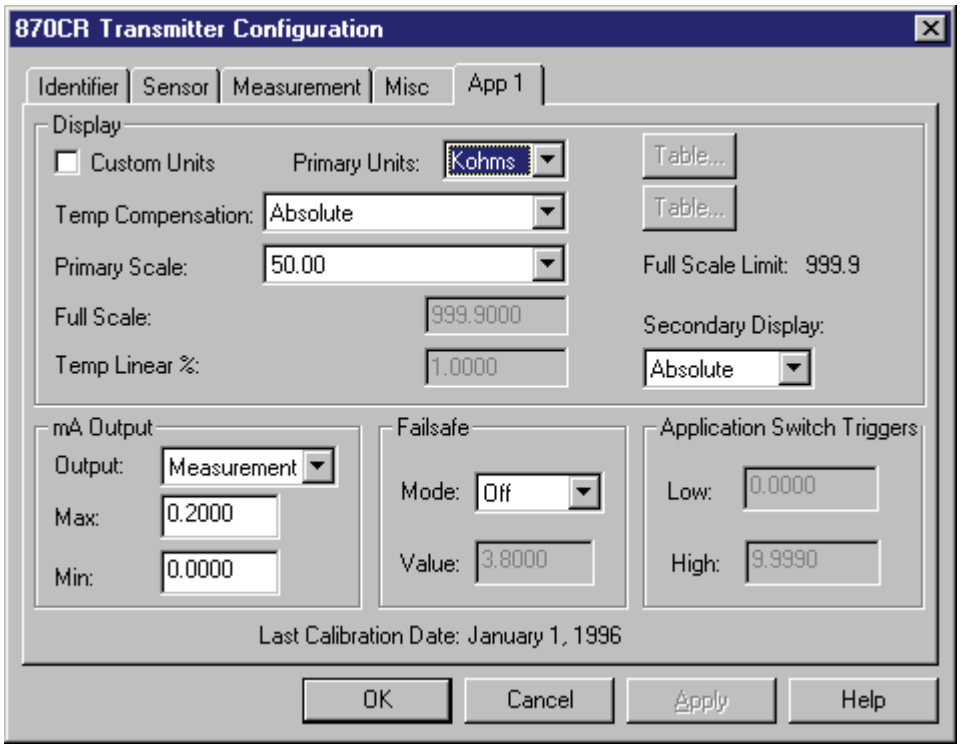


Figure M-11. Sample 870ITCR App1 Tab Screen

Field	Entry
Display	
Custom Units	√ = Custom; Blank = Not Custom
Primary Units	If not **Custom**, select from menu of choices. If **Custom**, select **%**, **g/l**, **ppm**, **oz/gal**, **ppt**, or **None**.
Temp Compensation	Select from menu of choices.
Primary Scale	Select from menu of choices.
Full Scale	Enter value up to full scale limit.
Temp Linear %	Enter value from 0 to 100,
Secondary Display	Select **Temp**, **Absolute**, or **mA**.
mA Output	
Output	If Analog Output Mode on sensor screen, specify **Absolute**, **Measurement**, or **Temperature**.
Max.	Enter 20 mA range value.
Min.	Enter 4 mA range value.
Failsafe	
Mode	Specify **Off**, **On**, or **Pulse**

Field	Entry
Value	If on, enter dc mA output between 3.8 and 20.5 mA.
Application Switch Triggers	Enter value of Low and High triggers.

Database Report

Table 44. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	30	Reference Temp #3	0
Tag Number	FT102	Temp Size App #1	02
Tag Name	870ITCR	Temp Size App #2	02
Device Name	DevNam	Temp Size App #3	02
Geo Location	Office	Chem Units #1	06
Application Select	00	Chem Units #2	01
Probe	00	Chem Units #3	01
Cell Factor	0.1	Absolute Scale #1	02
Primary Units #1	02	Absolute Scale #2	00
Primary Units #2	02	Absolute Scale #3	00
Primary Units #3	02	Custom Chem Scale #1	103
Custom Units #1	04	Custom Chem Scale #2	200
Custom Units #2	00	Custom Chem Scale #3	300
Custom Units #3	00	Meas #1 Units	kohms
Primary Scale #1	09	Measurement Mapping	00 00 00 00
Primary Scale #2	09	Output Range Max	1000
Primary Scale #3	09	Output Range Min	0
Prim Scale CMCP #1	00	TON Count (20 mA)	26533
Prim Scale CMCP #2	02	TON Count (4 mA)	5307
Prim Scale CMCP #3	02	Meas #2 Units	C
Prim Scale CMRG #1	0	Temp Units #1	01
Prim Scale CMRG #2	0	Temp Units #2	01
Prim Scale CMRG #3	0	Temp Units #3	01
Display Second #1	01	Chem Size Appl #1	15
Display Second #2	00	Chem Size Appl #2	02
Display Second #3	00	Chem Size Appl #3	02
Temp Comp TPCP #1	04	Temp Comp Temp 1 #1	10
Temp Comp TPCP #2	16	Temp Comp Val 1 #1	0
Temp Comp TPCP #3	04	Temp Comp Temp 2 #1	10
Temp Comp #1	1	Temp Comp Val 2 #1	0
Temp Comp #2	0.5	Temp Comp Temp 3 #1	10
Temp Comp #3	0.5	Temp Comp Val 3 #1	0
Reference Temp #1	20	Temp Comp Temp 4 #1	10
Reference Temp #2	0	Temp Comp Val 4 #1	0
Temp Comp Temp 5 #1	10	Temp Comp Val 2 #2	0
Temp Comp Val 5 #1	0	Temp Comp Temp 3 #2	0

Table 44. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Temp Comp Temp 6 #1	10	Temp Comp Val 3 #2	0
Temp Comp Val 6 #1	0	Temp Comp Temp 4 #2	0
Temp Comp Temp 7 #1	10	Temp Comp Val 4 #2	0
Temp Comp Val 7 #1	0	Temp Comp Temp 5 #2	0
Temp Comp Temp 8 #1	10	Temp Comp Val 5 #2	0
Temp Comp Val 8 #1	0	Temp Comp Temp 6 #2	0
Temp Comp Temp 9 #1	10	Temp Comp Val 6 #2	0
Temp Comp Val 9 #1	0	Temp Comp Temp 7 #2	0
Temp Comp Temp 10 #1	0	Temp Comp Val 7 #2	0
Temp Comp Val 10 #1	0	Temp Comp Temp 8 #2	0
Temp Comp Temp 11 #1	0	Temp Comp Val 8 #2	0
Temp Comp Val 11 #1	0	Temp Comp Temp 9 #2	0
Temp Comp Temp 12 #1	0	Temp Comp Val 9 #2	0
Temp Comp Val 12 #1	0	Temp Comp Temp 10 #2	0
Temp Comp Temp 13 #1	0	Temp Comp Val 10 #2	0
Temp Comp Val 13 #1	0	Temp Comp Temp 11 #2	0
Temp Comp Temp 14 #1	0	Temp Comp Val 11 #2	0
Temp Comp Val 14 #1	0	Temp Comp Temp 12 #2	0
Temp Comp Temp 15 #1	0	Temp Comp Val 12 #2	0
Temp Comp Val 15 #1	0	Temp Comp Temp 13 #2	0
Temp Comp Temp 16 #1	0	Temp Comp Val 13 #2	0
Temp Comp Val 16 #1	0	Temp Comp Temp 14 #2	0
Temp Comp Temp 17 #1	0	Temp Comp Val 14 #2	0
Temp Comp Val 17 #1	0	Temp Comp Temp 15 #2	0
Temp Comp Temp 18 #1	0	Temp Comp Val 15 #2	-0
Temp Comp Val 18 #1	0	Temp Comp Temp 16 #2	0
Temp Comp Temp 19 #1	0	Temp Comp Val 16 #2	0
Temp Comp Val 19 #1	0	Temp Comp Temp 17 #2	0
Temp Comp Temp 20 #1	0	Temp Comp Val 17 #2	0
Temp Comp Val 20 #1	0	Temp Comp Temp 18 #2	0
Temp Comp Temp 21 #1	0	Temp Comp Val 18 #2	0
Temp Comp Val 21 #1	0	Temp Comp Temp 19 #2	0
Temp Comp Temp 1 #2	0	Temp Comp Val 19 #2	0
Temp Comp Val 1 #2	0	Temp Comp Temp 20 #2	0
Temp Comp Temp 2 #2	0	Temp Comp Val 20 #2	0
Temp Comp Temp 21 #2	0	Temp Comp Val 18 #3	0
Temp Comp Val 21 #2	0	Temp Comp Temp 19 #3	0
Temp Comp Temp 1 #3	0	Temp Comp Val 19 #3	0
Temp Comp Val 1 #3	0	Temp Comp Temp 20 #3	0
Temp Comp Temp 2 #3	0	Temp Comp Val 20 #3	0
Temp Comp Val 2 #3	0	Temp Comp Temp 21 #3	0
Temp Comp Temp 3 #3	0	Temp Comp Val 21 #3	0
Temp Comp Val 3 #3	0	Chem Comp Temp 1 #1	0
Temp Comp Temp 4 #3	0	Chem Comp Val 1 #1	0
Temp Comp Val 4 #3	0	Chem Comp Temp 2 #1	0

Table 44. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Temp Comp Temp 5 #3	0	Chem Comp Val 2 #1	0
Temp Comp Val 5 #3	0	Chem Comp Temp 3 #1	0
Temp Comp Temp 6 #3	0	Chem Comp Val 3 #1	0
Temp Comp Val 6 #3	0	Chem Comp Temp 4 #1	0
Temp Comp Temp 7 #3	0	Chem Comp Val 4 #1	0
Temp Comp Val 7 #3	0	Chem Comp Temp 5 #1	0
Temp Comp Temp 8 #3	0	Chem Comp Val 5 #1	0
Temp Comp Val 8 #3	0	Chem Comp Temp 6 #1	0
Temp Comp Temp 9 #3	0	Chem Comp Val 6 #1	0
Temp Comp Val 9 #3	0	Chem Comp Temp 7 #1	0
Temp Comp Temp 10 #3	0	Chem Comp Val 7 #1	0
Temp Comp Val 10 #3	0	Chem Comp Temp 8 #1	0
Temp Comp Temp 11 #3	0	Chem Comp Val 8 #1	0
Temp Comp Val 11 #3	0	Chem Comp Temp 9 #1	0
Temp Comp Temp 12 #3	0	Chem Comp Val 9 #1	0
Temp Comp Val 12 #3	0	Chem Comp Temp 10 #1	0
Temp Comp Temp 13 #3	0	Chem Comp Val 10 #1	0
Temp Comp Val 13 #3	0	Chem Comp Temp 11 #1	0
Temp Comp Temp 14 #3	0	Chem Comp Val 11 #1	0
Temp Comp Val 14 #3	0	Chem Comp Temp 12 #1	0
Temp Comp Temp 15 #3	0	Chem Comp Val 12 #1	0
Temp Comp Val 15 #3	0	Chem Comp Temp 13 #1	0
Temp Comp Temp 16 #3	0	Chem Comp Val 13 #1	0
Temp Comp Val 16 #3	0	Chem Comp Temp 14 #1	0
Temp Comp Temp 17 #3	0	Chem Comp Val 14 #1	0
Temp Comp Val 17 #3	0	Chem Comp Temp 15 #1	0
Temp Comp Temp 18 #3	0	Chem Comp Val 15 #1	0
Chem Comp Temp 16 #1	0	Chem Comp Val 13 #2	0
Chem Comp Val 16 #1	0	Chem Comp Temp 14 #2	0
Chem Comp Temp 17 #1	0	Chem Comp Val 14 #2	0
Chem Comp Val 17 #1	0	Chem Comp Temp 15 #2	0
Chem Comp Temp 18 #1	0	Chem Comp Val 15 #2	0
Chem Comp Val 18 #1	0	Chem Comp Temp 16 #2	0
Chem Comp Temp 19 #1	0	Chem Comp Val 16 #2	0
Chem Comp Val 19 #1	0	Chem Comp Temp 17 #2	0
Chem Comp Temp 20 #1	0	Chem Comp Val 17 #2	0
Chem Comp Val 20 #1	0	Chem Comp Temp 18 #2	0
Chem Comp Temp 21 #1	0	Chem Comp Val 18 #2	0
Chem Comp Val 21 #1	0	Chem Comp Temp 19 #2	0
Chem Comp Temp 1 #2	0	Chem Comp Val 19 #2	0
Chem Comp Val 1 #2	0	Chem Comp Temp 20 #2	0
Chem Comp Temp 2 #2	0	Chem Comp Val 20 #2	0
Chem Comp Val 2 #2	0	Chem Comp Temp 21 #2	0
Chem Comp Temp 3 #2	0	Chem Comp Val 21 #2	0
Chem Comp Val 3 #2	0	Chem Comp Temp 1 #3	0

Table 44. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Chem Comp Temp 4 #2	0	Chem Comp Val 1 #3	0
Chem Comp Val 4 #2	0	Chem Comp Temp 2 #3	0
Chem Comp Temp 5 #2	0	Chem Comp Val 2 #3	0
Chem Comp Val 5 #2	0	Chem Comp Temp 3 #3	0
Chem Comp Temp 6 #2	0	Chem Comp Val 3 #3	0
Chem Comp Val 6 #2	0	Chem Comp Temp 4 #3	0
Chem Comp Temp 7 #2	0	Chem Comp Val 4 #3	0
Chem Comp Val 7 #2	0	Chem Comp Temp 5 #3	0
Chem Comp Temp 8 #2	0	Chem Comp Val 5 #3	0
Chem Comp Val 8 #2	0	Chem Comp Temp 6 #3	0
Chem Comp Temp 9 #2	0	Chem Comp Val 6 #3	0
Chem Comp Val 9 #2	0	Chem Comp Temp 7 #3	0
Chem Comp Temp 10 #2	0	Chem Comp Val 7 #3	0
Chem Comp Val 10 #2	0	Chem Comp Temp 8 #3	0
Chem Comp Temp 11 #2	0	Chem Comp Val 8 #3	0
Chem Comp Val 11 #2	0	Chem Comp Temp 9 #3	0
Chem Comp Temp 12 #2	0	Chem Comp Val 9 #3	0
Chem Comp Val 12 #2	0	Chem Comp Temp 10 #3	0
Chem Comp Temp 13 #2	0	Chem Comp Val 10 #3	0
Chem Comp Temp 11 #3	0	Temperature Units	00
Chem Comp Val 11 #3	0	Temperature Mode	00
Chem Comp Temp 12 #3	0	Temp Auto Mode	40
Chem Comp Val 12 #3	0	Temp Manual Mode	100
Chem Comp Temp 13 #3	0	Temp Type	04
Chem Comp Val 13 #3	0	Damp	02
Chem Comp Temp 14 #3	0	Meas Stability	01
Chem Comp Val 14 #3	0	Meas Stability Time	05
Chem Comp Temp 15 #3	0	Meas Stability Var	09
Chem Comp Val 15 #3	0	Temp Stability	00
Chem Comp Temp 16 #3	0	Temp Stability Time	00
Chem Comp Val 16 #3	0	Temp Stability Var	09
Chem Comp Temp 17 #3	0	Timeout	600
Chem Comp Val 17 #3	0	Minor Passcode	0
Chem Comp Temp 18 #3	0	Major Passcode	0
Chem Comp Val 18 #3	0	Number Applications	00
Chem Comp Temp 19 #3	0	Trigger: #1 High	9.999
Chem Comp Val 19 #3	0	Trigger: #2 Low	-1e+010
Chem Comp Temp 20 #3	0	Trigger: #2 High	0
Chem Comp Val 20 #3	0	Trigger: #3 Low	0
Chem Comp Temp 21 #3	0	Hold Configuration	00
Chem Comp Val 21 #3	0	mA Hold Value	-3.402823e+38
Analog Output #1	01	Meas 1 Hold Value	-1.469368e-039
Analog Output #2	01	Temp Hold Value	0
Analog Output #3	01	Absolute Hold Value	0
Lower Range Value #1	0	Cal Name (App 1):	GTF

Table 44. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Lower Range Value #2	0	Cal Name (App 2):	STD
Lower Range Value #3	0	Cal Name (App 3):	GTF
Upper Range Value #1	0.2	Cal Date: #1	4/16/98
Upper Range Value #2	0.2	Cal Date: #2	4/23/98
Upper Range Value #3	0.2	Cal Date: #3	4/30/98
Output Failsafe #1	00	Sales Order Number	95F0000000010001
Output Failsafe #2	00	MS Code	870ITCR
Output Failsafe #3	00	Software Version	53 56 4e 5f
Output mA #1	-0.0125	Low Meas Cal #1	0
Output mA #2	-0.0125	Low Meas Cal #2	10
Output mA #3	-0.0125	Low Meas Cal #3	25
High Meas Cal #1	95	Thermistor Cal (#1)	100000
High Meas Cal #2	25	Thermistor Cal (#2)	2.5
High Meas Cal #3	35		
Kernal Major Rev #	00		
Kernal Minor Rev #	04		
SREVMJ	01		
SREVMN	14		
Display Major Rev #	00		
Display Minor Rev #	00		
Parameter Tbl Offset	c9 3b		
Parameter Table CRC	bf 0e		
Parameter Table Type	00		
Parameter Table Size 00	ff		
Reserved	00 00 00		
Calibration Req'd	06		
Core Manufact. Date	1/1/94		
Output Mode	01		
Enable/Disable Diag	c3 f0 f0 c3		
Clear Diagnostics	00 00 00 00		
Low Cal Point KCL 1	0		
Low Cal Point KCL 2	0		
Low Cal Point KCL 3	0		
High Cal Point KCH 1	1		
High Cal Point KCH 2	1		
High Cal Point KCH 3	1		
Low Cal Point VCL 1	0		
Low Cal Point VCL 2	0		
Low Cal Point VCL 3	0		
Temperature Offset	0		
User In	0		
Drive 0 Amp Offset	0		
Drive 90 Amp Offset	0		
Meas 0 Amp Offset	0		
Meas 90 Amp Offset	0		

Table 44. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Freq Conv Factor	500000		
Ohm Ref Res	140		
K Ref Resistance	1960		

Appendix N. Non Foxboro Devices Using HART Communication Protocol

This appendix provides information that is exclusive to HART devices in regard to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Configuration.

NOTE

For information on any of the parameters shown on screens in this appendix, refer to information from your product's manufacturer and/or the HART Foundation.

Device Data Screen

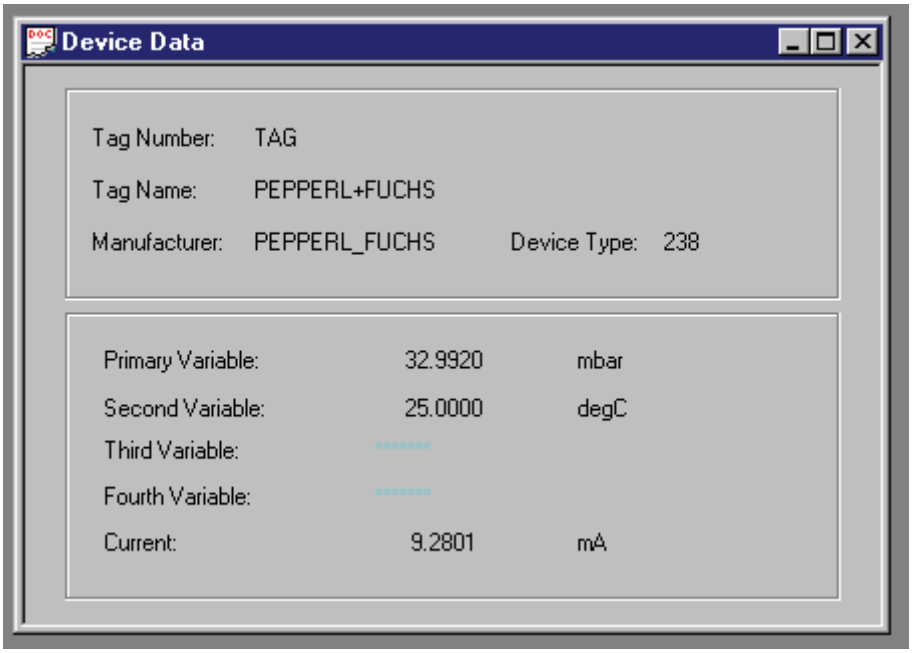


Figure N-1. Sample Non Foxboro Device Data Screen

Configuration

Identifier Tab Screen

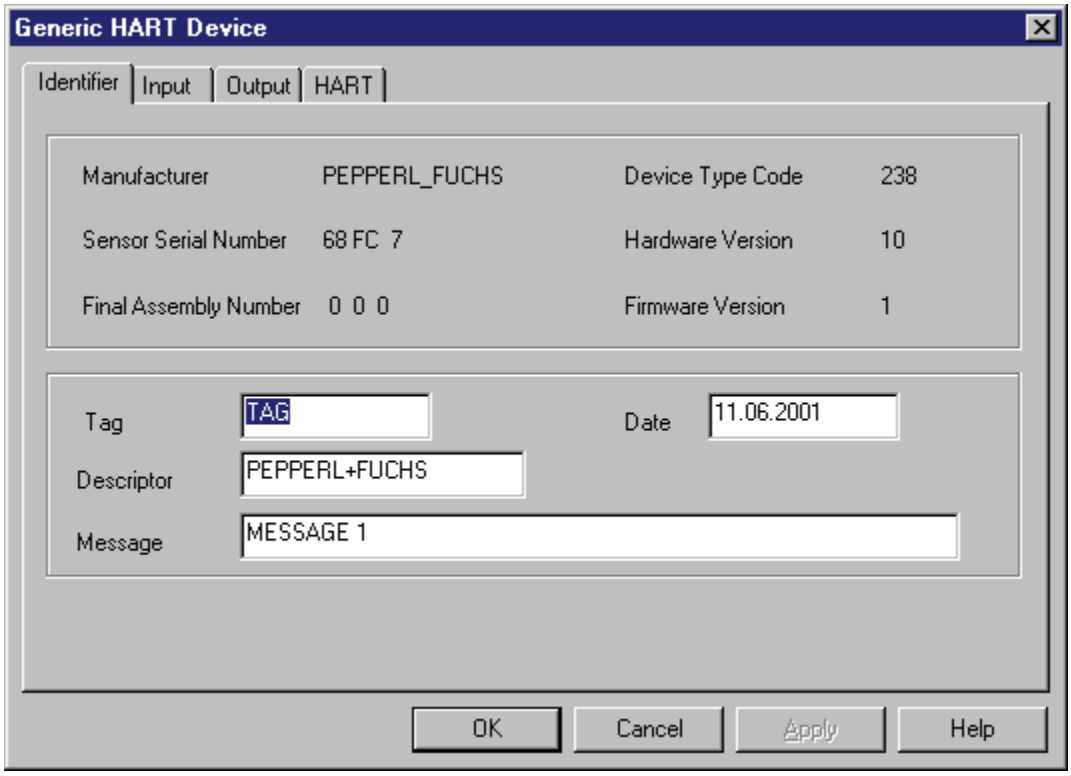


Figure N-2. Sample Non Foxboro Identifier Tab Screen

Field	Entry
Tag	Enter the device tag with a maximum of 8 characters.
Descriptor	Enter the device descriptor with a maximum of 16 characters.
Date	Enter the date.
Message	Enter the message with maximum of 32 characters.

Input Tab Screen

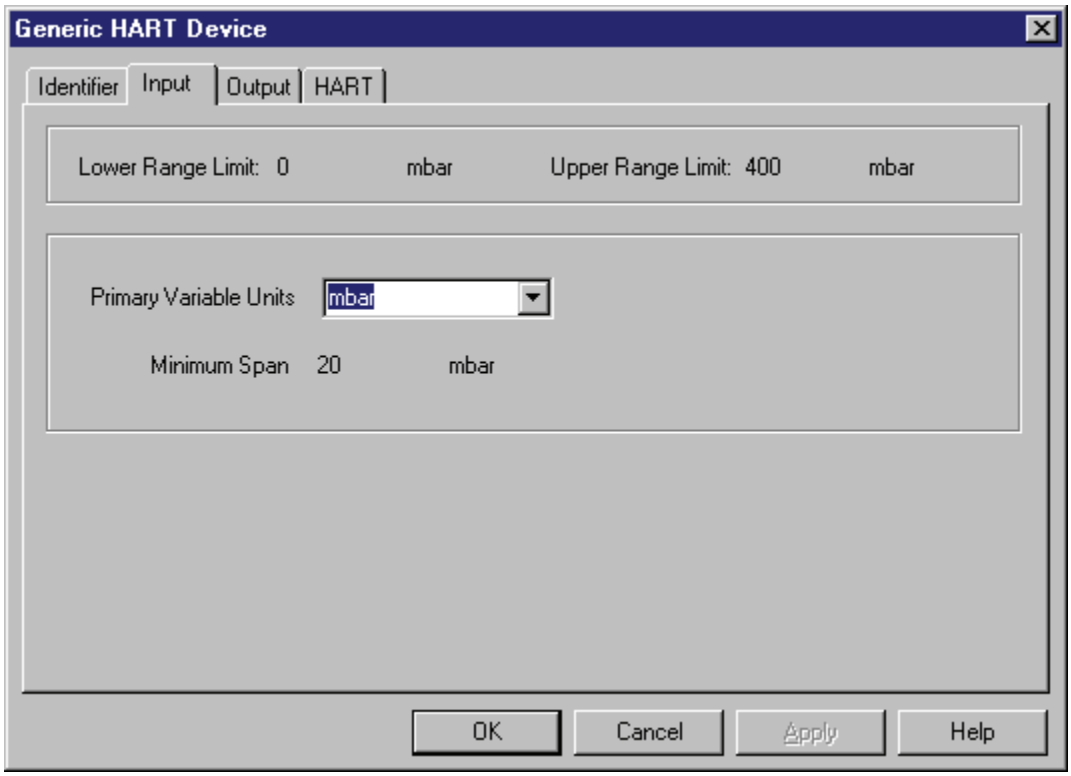


Figure N-3. Generic HART Input Screen

Field	Entry
Lower Range Limit	Shows the Lower Range Limit of the device.
Upper Range Limit	Shows the Upper Range Limit of the device.
Primary Variable Units	Enter the units of the Primary variable.
Minimum Span	Shows the minimum span of the device.

Output Tab Screen

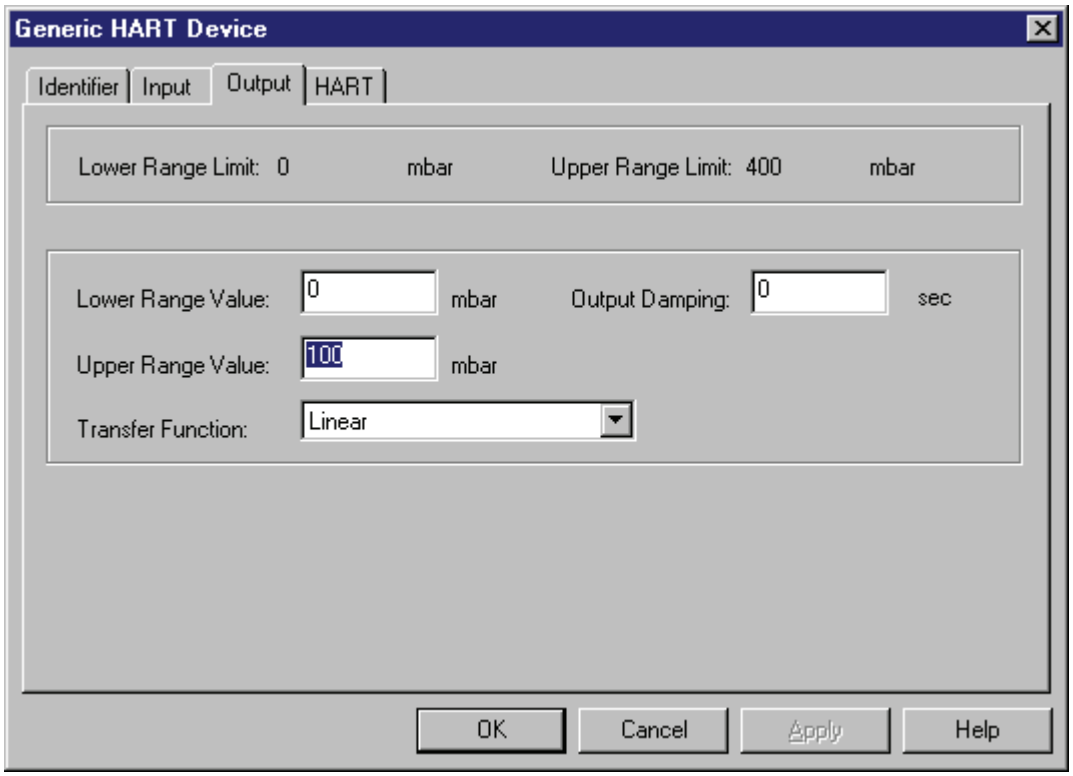


Figure N-4. Sample Non Foxboro Output Tab Screen

Field	Entry
Lower Range Limit	Shows value of Lower Range Limit of device.
Upper Range Limit	Shows value of Upper Range Limit of device.
Lower Range Value (LRV)	Enter value at which device outputs 4 mA.
Upper Range Value (URV)	Enter value at which device outputs 20 mA.
Output Damping	Enter damping value from **0** to **32** seconds.
Transfer Function	Select from menu of selections. Most often **Linear** or **Square Root**.

HART Tab Screen

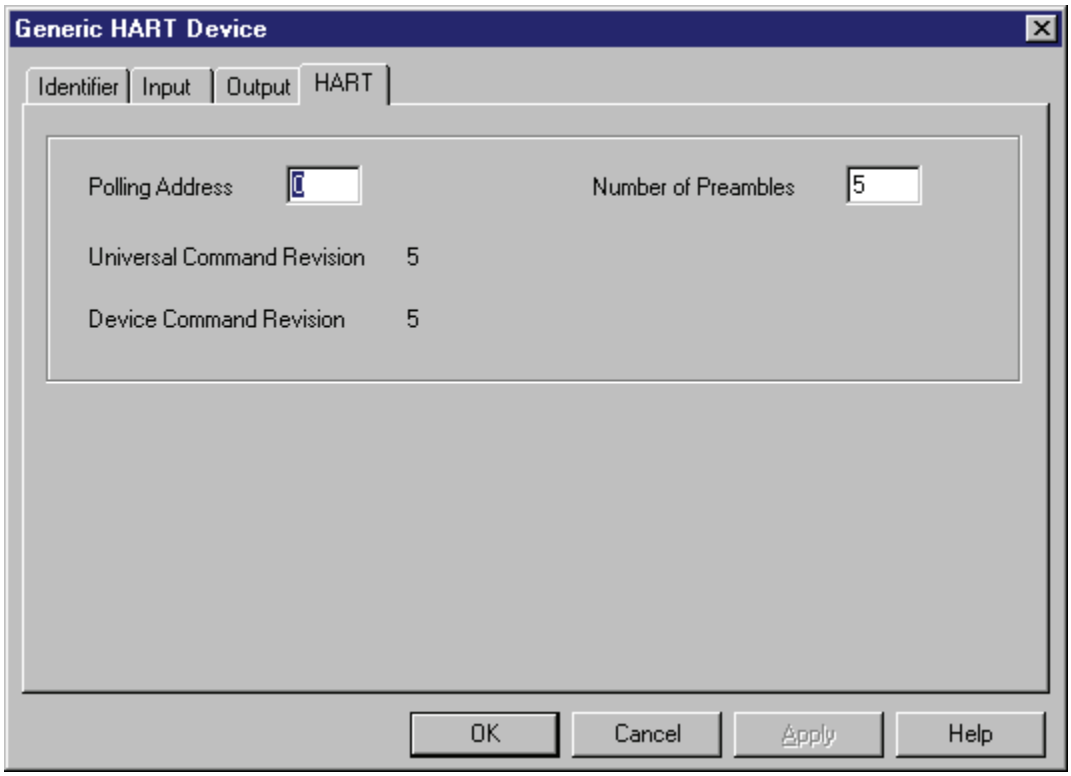


Figure N-5. Generic HART Screen

Field	Entry
Polling Address	Enter the polling address for the HART device.
Number of Preambles	Enter the number of preambles.
Universal Command Revision	Shows the revision of the universal commands.
Device Command Revision	Shows the revision of the device commands.

Commands Dialog Box

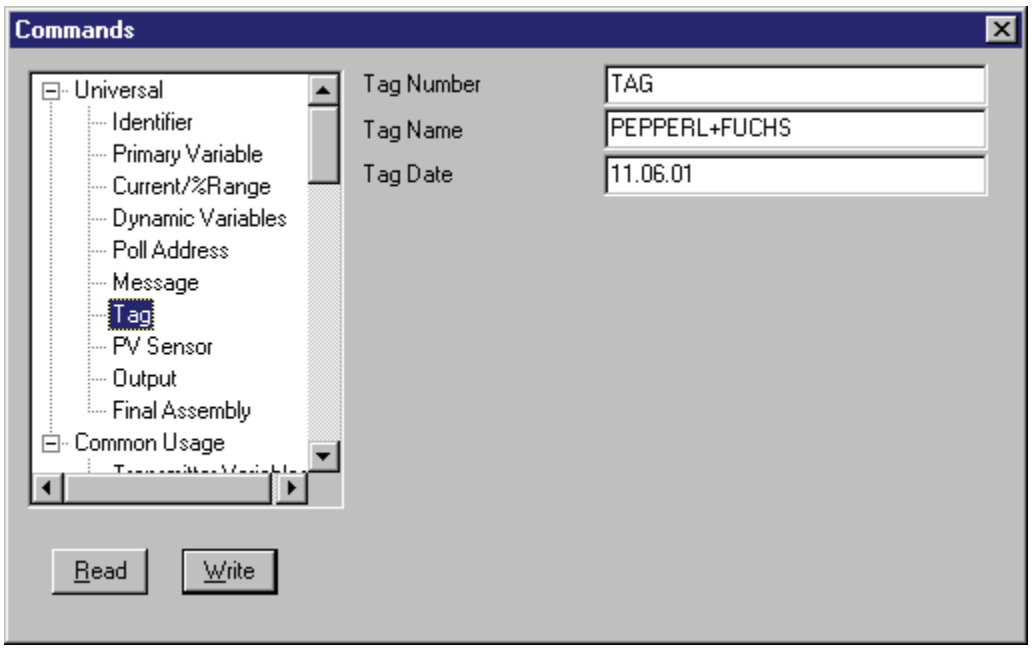


Figure N-6. Generic HART Commands Dialog Box to Execute Universal and Common Practice Commands.

Only the Universal and Common Usage commands are supported on non Foxboro devices. Device-specific commands are not supported. The Commands dialog box enables you to read and/or write data on the selected command. Select the menu item **Edit > Command** to start the Command dialog box.

To view the list of Universal commands, click on the symbol to the left of Universal. Clicking on a specific command causes the read and/or write button to be highlighted and the present information on that command to be displayed. The Universal commands are listed in Table 45. Also shown is their read/write capability.

Table 45. Universal Commands

Command	Read/Write Capability
Identifier	R
Primary Variable	R
Current/% Range	R
Dynamic Variables	R
Poll Address	W
Message	R/W
Tag	R/W
PV Sensor	R
Output	R

Table 45. Universal Commands (Continued)

Command	Read/Write Capability
Final Assembly	R/W

To view the list of Common Usage commands, click on the symbol to the left of Common Usage. Clicking on a specific command causes the read and/or write button to be highlighted and the present information on that command to be displayed. The Common Usage commands are listed in Table 46. Also shown is their read/write capability.

Table 46. Common Usage Commands

Command	Read/Write Capability	Command	Read/Write Capability
Device Variables	R	Variable Damping	W
Damping	W	Variable Sensor ID	W
Range Values	W	Unit Tag	R/W
SPAN	W	Preamplifier	W
ZERO	W	Analog/% Range	R
Reset Changed Flag	W	Dynamic Analog	R
EEPROM	W	Analog Output	R
Fixed mA	W	Analog Information	R
Self Test	W	Analog Damp	W
Reset	W	Analog Range	W
PV Zero	W	Analog Fixed	W
PV Units	W	Trim Analog Zero	W
Trim Zero	W	Trim Analog Gain	W
Trim Gain	W	Analog Transfer	W
Transfer Function	W	Analog Endpoint	R
PV Serial	W	Burst Variables	W
Dynamic Variables	W	Burst Command	W
Variable Zero	W	Burst Mode Enable	W
Variable Units	W	Dynamic Variables	R
Variable Information	W		

Calibration

The standard Calibration procedures are ReRange, mA Calibration, and ReZero. They may or may not be accessible for your device.

Test

The standard Test procedures are Device Status, Set mA/Pulse Output, Reset, Self Test, and Message. They may or may not be accessible for your device.

Appendix O. IMT96 Magnetic Flow Transmitters

This appendix provides information that is exclusive to the IMT96 Magnetic Flow Transmitters in regards to the Intelligent Field Device Configurators. It contains information on:

- Device Data Screen
- Device Error Messages
- Calibration
- Pulse Preset
- Configuration
- Database Report.

Device Data Screen

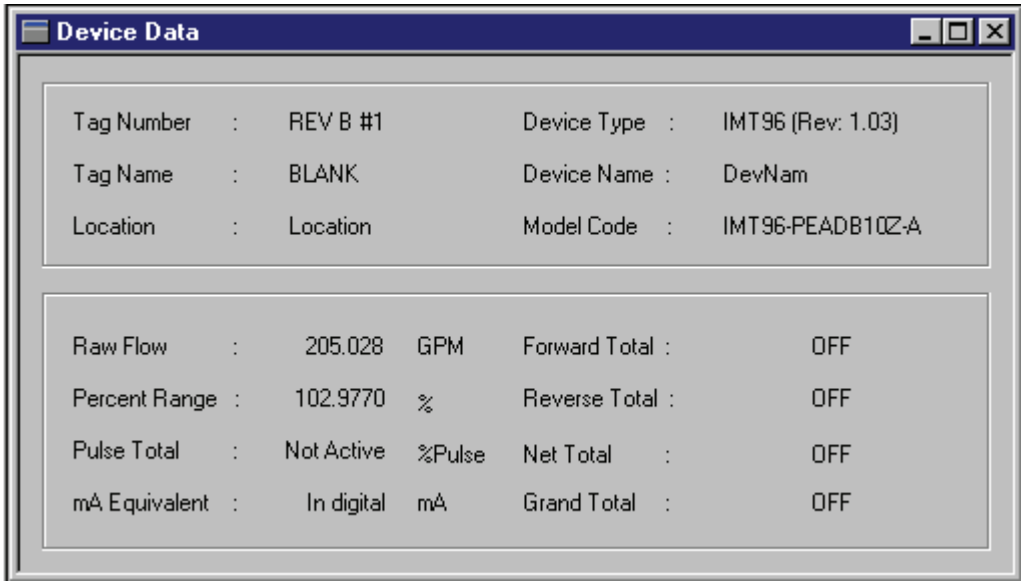

Device Data
Tag Number : REV B #1
Device Type : IMT96 (Rev: 1.03)
Tag Name : BLANK
Device Name : DevNam
Location : Location
Model Code : IMT96-PEADB10Z-A
Raw Flow : 205.028 GPM
Forward Total : OFF
Percent Range : 102.9770 %
Reverse Total : OFF
Pulse Total : Not Active %Pulse
Net Total : OFF
mA Equivalent : In digital mA
Grand Total : OFF

Figure O-1. Sample IMT96 Device Data Screen

Error Messages

Table 47. Transmitter Status Error Messages

Message	Explanation	Recommended Action
Primary Status Fields		

Table 47. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
Device Busy	Transmitter is busy.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Init Required	Initializing is required.	If problem persists, select **Test > Go On-Line**. If this does not clear problem, contact the CSC.
Diagnostic Error	Indicates an active diagnostic error.	See Secondary Status Fields and Diagnostic Codes to determine problem and corrective action.
Secondary Status Error	Indicates an error in secondary status.	The secondary status error is shown in Column 2 of the screen display.
Secondary Status Fields		
Signal Lock Off	External contact is off.	Set by user; no action required.
Startup Test	Transmitter cannot exit its boot code.	Correct Diagnostic Error or Secondary Status Error also displayed.
Electrode Test	Unreliable measurement of electrode voltage.	See Extended Status - Hardware below.
Coil Test	Unreliable measurement of coil current.	See Extended Status - Hardware below.
Extended Status - Hardware		
Coils		
Low Coil Current Test	Transmitter unable to generate a reliable measurement of coil current.	Check coil wiring at flowtube and transmitter.
High Coil Current Test		Service is required.
Positive Coil Test		Check wiring and flowtube coil.
Negative Coil Test		
Electrodes		
Electrode in Range Test	Transmitter unable to generate a reliable measurement of electrode voltage.	Check signal wiring between flowtube and transmitter. Also see MI 020-391.
Positive Electrode Test		
Negative Electrode Test		
Setup		
MultiRange Setup	Setup needed.	Check that Configuration and Contact Inputs 1 and 2 are set up properly.
Extended Status - Process		
Process Problems		

Table 47. Transmitter Status Error Messages (Continued)

Message	Explanation	Recommended Action
Signal Lock Test	Signal lock is on.	Check that Contact Inputs 1 and 2 are activated by an external set of contacts or switch.
Pulses Lag Total Test	Totalizer putting out pulses at the maximum rate but falling behind the actual total.	Reconfigure totalizer display so that each pulse represents a larger volume.
Total Rollover Test	Total exceeds limit of configured format.	Reconfigure total format if necessary and reset totals.
A to D Calibration Test	Electronics problem.	Service is required.
Alarms		
High Flow	Flow above configured high flow rate.	Make process change or reconfigure alarm setpoint.
Low Flow	Flow below configured low flow rate.	
High Forward Total 1	Total above configured High Fwd Tot 1.	Make process change or reconfigure Tot Alm Setpt and reset totals.
High Forward Total 2	Total above configured High Fwd Tot 2.	

Calibration

You can perform the following calibration procedures on an IMT96 transmitter using the Intelligent Field Device Configurator:

- mA Output
- Reset Totals
- Zero Flow
- Restore Zero Flow Default.

mA Output

As your device was accurately calibrated at the factory, this function is not normally required. However, the mA output can be trimmed with this procedure if it is necessary to match the output to the output of a specific receiving device.

The procedure to perform a mA Output Calibration is:

1. Insert an accurate mA meter (or digital voltmeter and precision resistor) in the loop wiring.
2. Select **mA Output** from the **Calibration** menu.
3. Follow the prompt to put the device in Manual mode and select **Continue**.
4. Select **4 mA Output**.

5. Set the **Step Size** (**-0.5**, **-0.05**, **-0.005**, **0.005**, **0.05**, **0.5**), and select **Apply**.
6. Repeat Step 4 until you are satisfied with the output. The cumulative change is shown on the screen display.
7. Select **20 mA Output**.
8. Repeat Steps 4 and 5. When finished, select **Continue**.
9. The screen then displays the adjustments. To accept this change, select **Continue**.
10. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

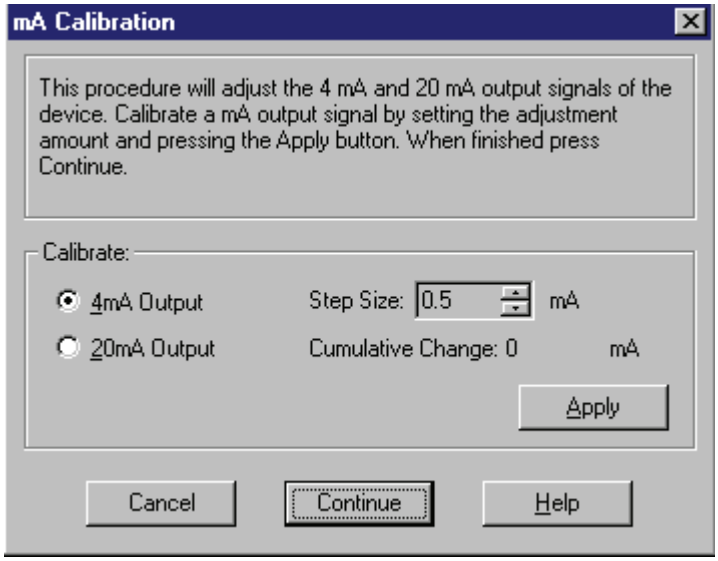

mA Calibration
This procedure will adjust the 4 mA and 20 mA output signals of the device. Calibrate a mA output signal by setting the adjustment amount and pressing the Apply button. When finished press Continue.
Calibrate:
4mA Output
20mA Output
Step Size: 0.5
mA
Cumulative Change: 0
mA
Apply
Cancel
Continue
Help

Figure O-2. Sample IMT96 mA Calibration Screen

Reset Totals

This procedure resets the transmitter totals. The Net, Forward and Reverse Totals are reset as a group. The Grand Total is individually reset.

1. Select **Reset Totals** from the **Calibration** menu or the Reset Totals icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select the device total(s) to reset to zero. You can select **Net, Forward, and Reverse Totals** or **Grand Total**. Then select **Continue**.

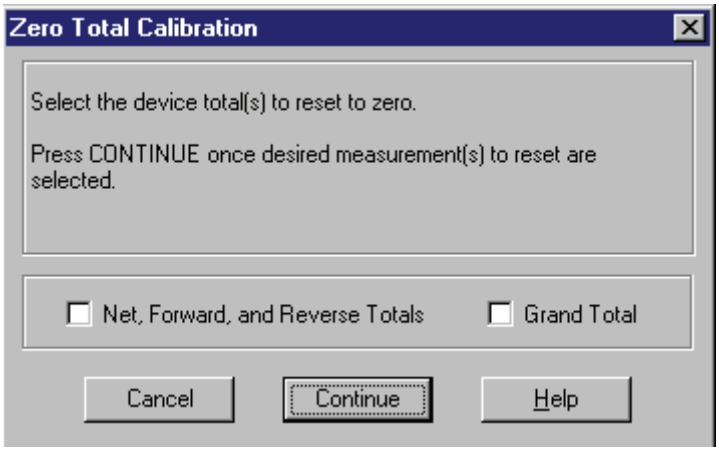


Figure O-3. Sample IMT96 Reset Totals Screen

4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Zero Flow

This procedure causes the device to rezero the measurement when zero flow is in the flowtube.

1. Select **Zero Flow** from the **Calibration** menu or the Zero Flow icon from the device toolbar.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Select **Continue** when zero flow is present in the flowtube.
4. Wait while the device is zeroing.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Restore Zero Flow Default

This procedure restores the factory zero setting.

1. Select **Restore Zero Flow Default** from the **Calibration** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Wait while the factory zero setting is restored.
4. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurements.

Pulse Preset

1. Select **Pulse Preset** from the **Test** menu.
2. Follow the prompt to put the device in Manual mode and select **Continue**.
3. Enter a value to set as the pulse rate and select **Apply**.

4. Select **Continue** when done testing.
5. Follow the prompt to put the device back into Automatic mode. Select **Continue** to resume dynamic measurement.

Configuration

Identifier Tab Screen

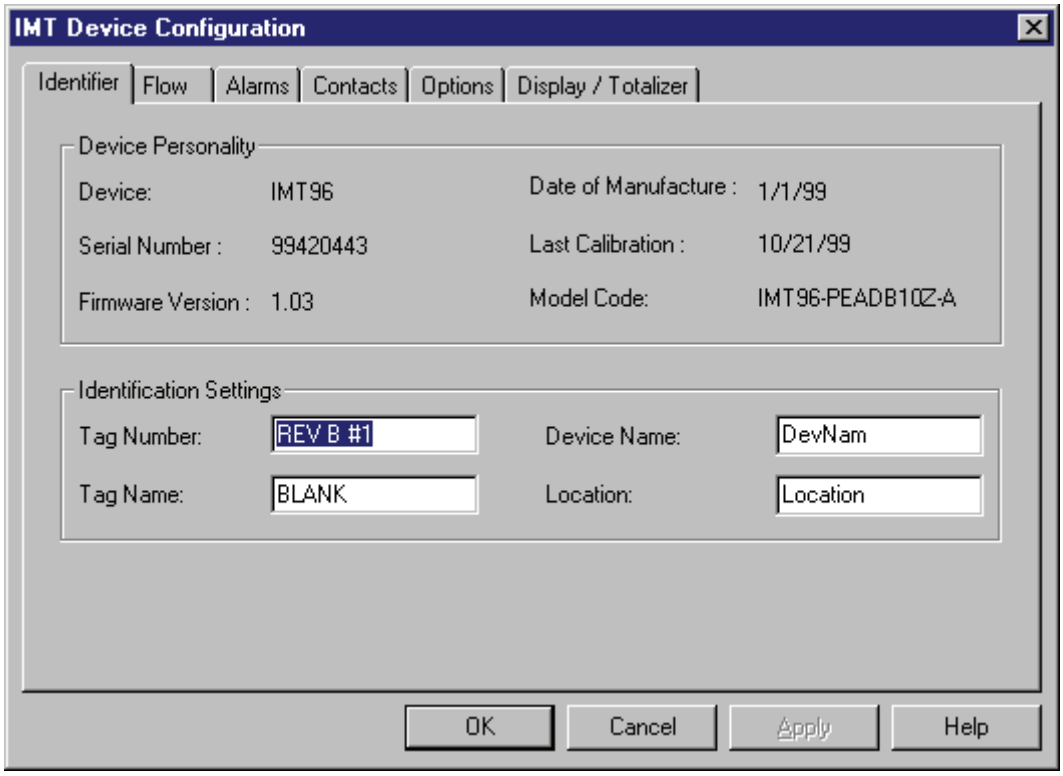


Figure O-4. Sample IMT96 Identifier Tab Screen

Field	Entry
Tag Number	Enter maximum of 12 characters. The first 8 characters become the transmitter filename.
Tag Name	Enter maximum of 14 characters. Optional, used for reference only.
Device Name	Enter maximum of 6 characters. NOTE: To disable enhanced protocol name checking with I/A Series Versions 3.0 or later, enter **DevNam**.
Location	Enter maximum of 14 characters. Optional, used for reference only.

Flow Tab Screen

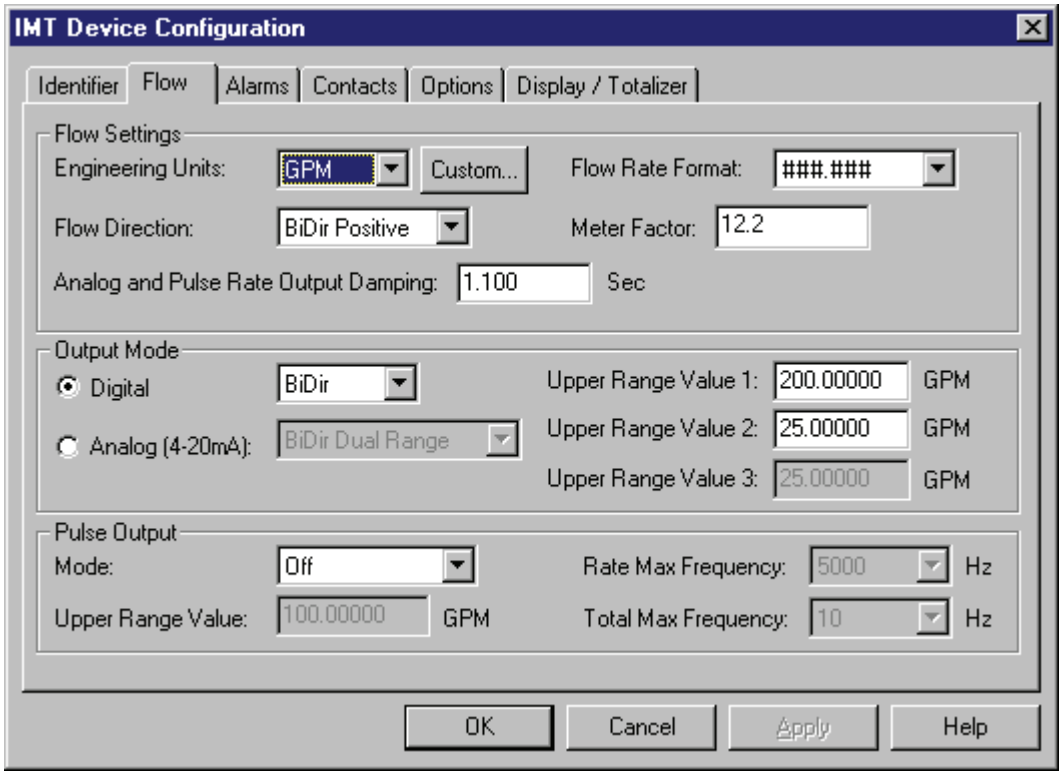


Figure O-5. Sample IMT96 Flow Tab Screen

Field	Entry
Flow Settings	
Engineering Units	Select from menu of choices or **Custom**.
Flow Direction	Select **Positive**, **Reverse**, **BiDir Positive**, or **BiDir Reverse**.
Analog and Pulse Rate Output Damp.	Enter damping response time from 0.0 to 99.9 seconds.
Flow Rate Format	Select from menu of eight choices.
Meter Factor	Enter the "IMT96 Cal Fact" factor or see *Mounting Hardware Kits To Replace 823DP, 843DP, and 863DP With IDP10 Differential Pressure Transmitters* (MI 021-412).
Output Mode	
Digital	Select **UniDirectional** or **BiDirectional** flow.
Analog	Select **UniDirectional**, **Unidirectional Multi-Range**, **BiDirectional Dual Range**, or **BiDirectional Split Range**.
Upper Range Values	Enter Upper Range Values in units shown.
Pulse Output	
Mode	Select **Off**, **Pulse Rate**, or **Pulse Total**.

Field	Entry
Upper Range Value	If Pulse Rate Mode, enter Pulse Out URV between minimum and maximum URV of the flowtube (not greater than 999999).
Rate Max Frequency	If Pulse Rate Mode, select **Rate Max Frequency** of **1000**, **2000**, **5000**, or **10000** Hz.
Total Max Frequency	If Pulse Total Mode, select **Total Max Frequency** of **10** or **100** Hz.

Alarms Tab Screen

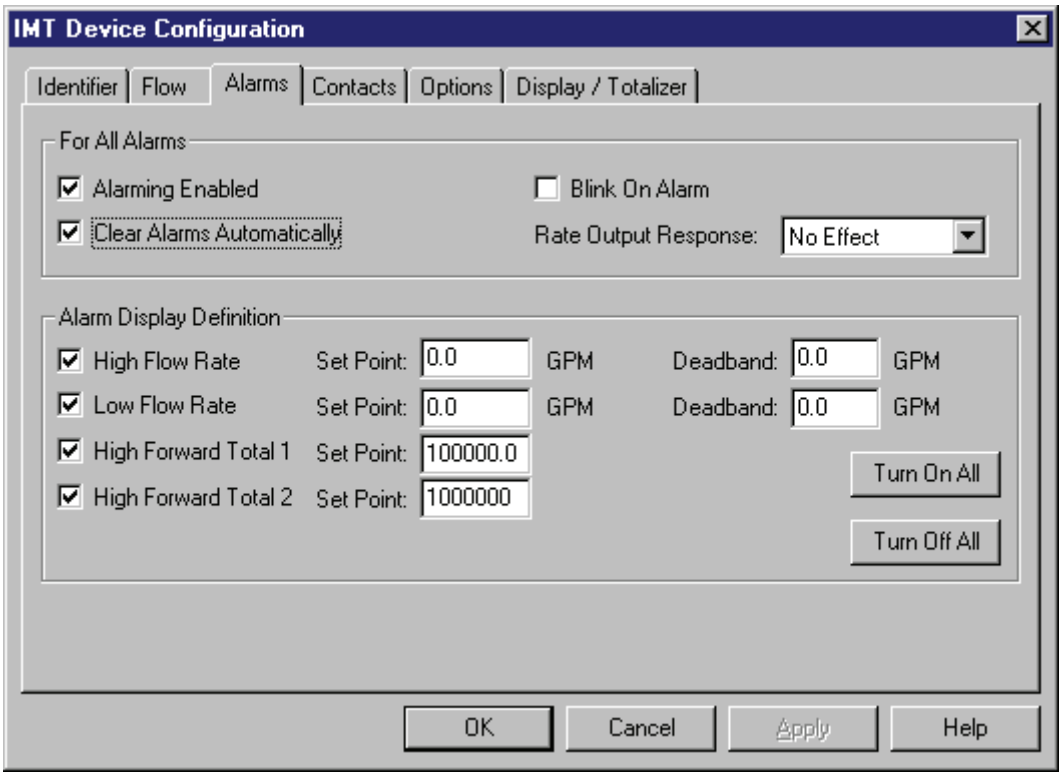


Figure O-6. Sample IMT96 Alarms Tab Screen

Field	Entry
For All Alarms	
Alarming Enabled	√ = On; Blank = Off.
Clear Alarms Automatically	√ = Auto; Blank = Manual.
Blink On Alarm	√ = Blink; Blank = Don't Blink.
Rate Output Response	Select **No effect**, **Go Downscale**, or **Go Upscale**.
Alarm Display Definition	
High Flow Rate	√ = On; Blank = Off. If On, enter Set Point and Deadband.
Low Flow Rate	√ = On; Blank = Off. If On, enter Set Point and Deadband.

Field	Entry
High Forward Total 1	√ = On; Blank = Off. If On, enter Set Point.
High Forward Total 2	√ = On; Blank = Off. If On, enter Set Point.
Empty Pipe	√ = On; Blank = Off.
Turn On All	Turns all alarms on.
Turn Off All	Turns all alarms off.

Contacts Tab Screen

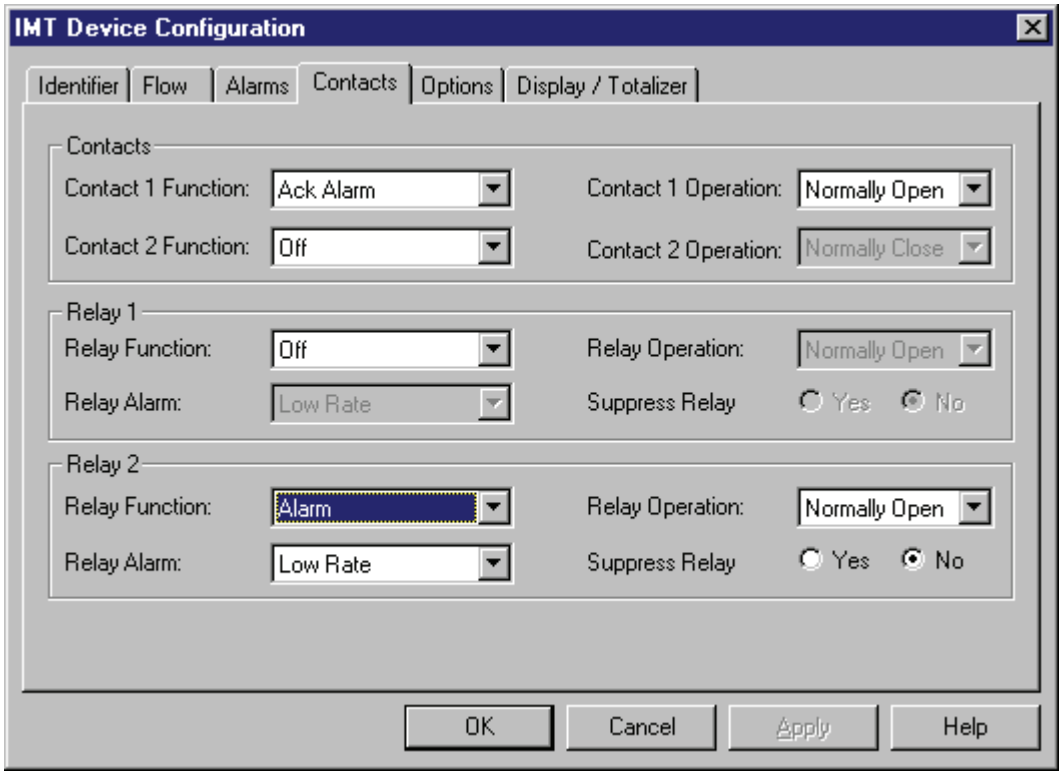


Figure O-7. Sample IMT96 Contacts Tab Screen

Field	Entry
Contacts	
Contact 1 Function	Select **Off**, **Ack Alarm**, **Reset Net Total**, **Reset Gr Total**, **Reset All Total**, **Multi-range**, or **Signal Lock**.
Contact 1 Operation	If Contact 1 Function is not off, select **Normally Open** or **Normally Closed**.
Contact 2 Function	Similar to Contact 1 Function.
Contact 2 Operation	Similar to Contact 1 Operation
Relay 1	

Field	Entry
Relay Function	Select **Off**, **Alarm**, **Alarm & Diag**, **Diagnostics**, **Flow Direction**, or **Test Mode**.
Relay Alarm	If Relay Function is not off, select **High Rate**, **Low Rate**, **High Forward Total 1**, **High Forward Total 2**, **Empty Pipe**, or **Any Alarm**.
Relay Operation	If Relay Function is not off, select **Normally Open** or **Normally Closed**.
Suppress Relay	If Relay Function is not off, select **Yes** to suppress reactivation of an alarm or **No** for no suppression.
Relay 2 (Similar to Relay 1)	

Options Tab Screen

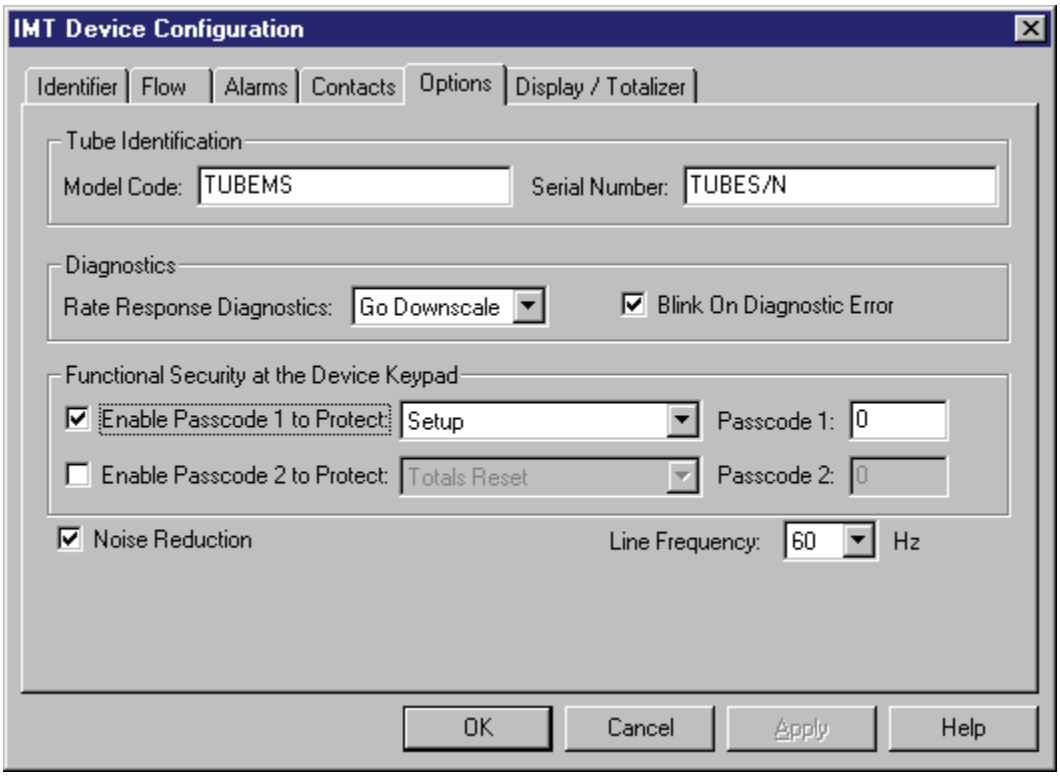


Figure O-8. Sample IMT96 Options Tab Screen

Field	Entry
Tube Identification	
Model Code	Enter model code of flowtube.
Serial Number	Enter serial number of flowtube.
Diagnostics	

Field	Entry
Rate Response Diagnostics	Select **Go Downscale** or **Go Upscale**.
Blink On Diagnostic Error	√ = Blink; Blank = Don't Blink.
Functional Security at the IMT96 Keypad	
Enable Passcode 1	√ = Enable; Blank = Disable. If Enabled, select **Setup**, **Totals Reset**, **Setup & Totals**, **Test Mode**, **Test Mode & Setup**, **Test Mode and Totals**, or **Test Mode, Setup & Totals**. Then enter 4 digit passcode.
Enable Passcode 2	Similar to Enable Passcode 1.
Noise Reduction	√ = On; Blank = Off.
Empty Pipe Detection	√ = On; Blank = Off.
Line Frequency	Select **50 Hz** or **60 Hz**.
Empty Pipe Effect	Select **No Effect** or **Auto Signal Lock**.

Display/Totalizer Tab Screen

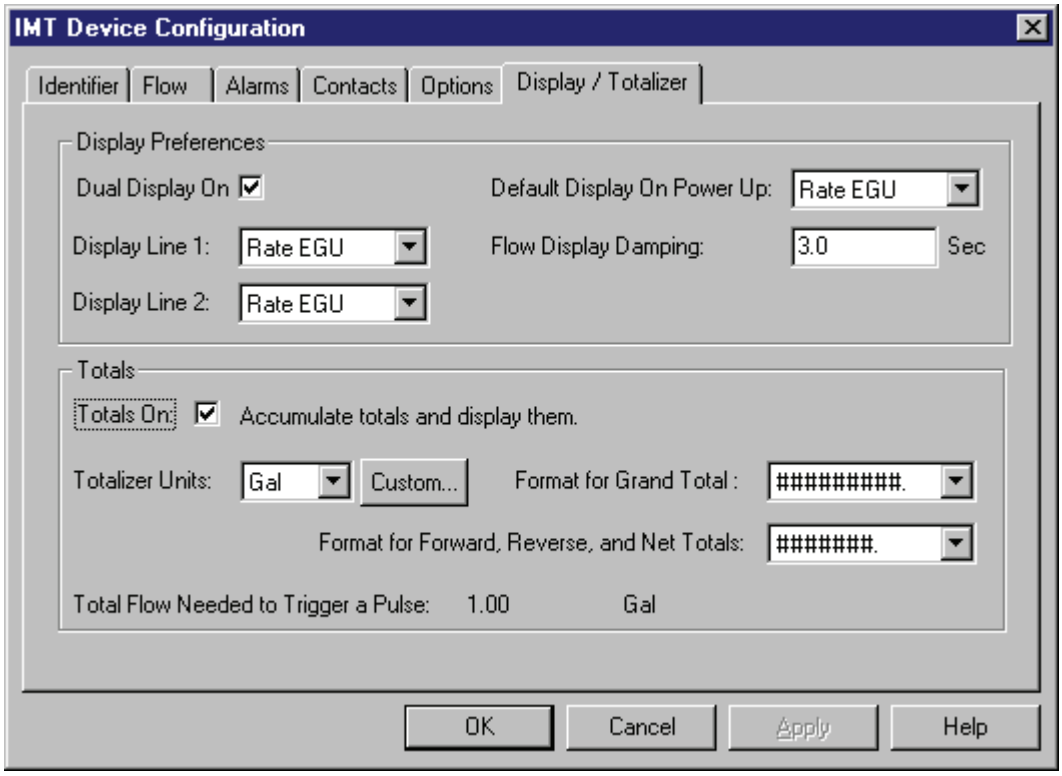


Figure O-9. Sample IMT96 Display/Totalizer Tab Screen

Field	Entry
Display Preferences	

Field	Entry
Dual Display On	√ = On; Blank = Off.
Display Line 1	If **Dual Display On** is checked (√), select from menu of six choices.
Display Line 2	If **Dual Display On** is checked (√), select from menu of six choices.
Default Display	Select from menu of seven choices.
Flow Display Damping	Enter damping response time for local display between 0.00 and 99.9 seconds.
Totals	
Total On	√ = On; Blank = Off.
Totalizer Units	If Totalizer On is checked (√), select **Gal**, **Lit**, or **Custom**.
Format for Grand Total	If Totalizer On is checked (√), select from menu of eight choices.
Format for Forward, Reverse, and Net Totals	If Totalizer On is checked (√), select from menu of eight choices.

Database Report

NOTE

If a parameter in the report is "UNUSED," the corresponding value shown has no meaning for that device.

Table 48. Sample Database Report

Parameter	Value	Parameter	Value
Transmitter Type #	28	Tot 1 Alarm Set Poin	100000
Tag Number	REV B #1	Tot 2 Alarm On	00
Tag Name	IMT96	Tot 2 Alarm Set Poin	1000000
Device Name	DevNam	Rate Response Alarm	01
Geo Location	lab	Display Response Ala	00
Date of Manufacture	01/25/00	Alarm Clear	01
Transmitter MS Code	IMT96-PEADB10Z-A	Rate Response Diag	00
Transmitter Serial N	99420443	Display Response Dia	01
Tube MS Code 1	TUBEMS	Tube Serial Number	TUBES/N
Tube MS Code 2		Passcode 1 On	00
Write Protect	00	Pass 1 Protect	00
Default Display	00	Passcode 1	0
Dual Display On/Off	00	Passcode 2 On	00
Dual Display Line 1	00	Pass 2 Protect	01
Dual Display Line 2	00	Passcode 2	2
Rate EGU M1	00	Line Frequency	3c
Flow Rate Units M1	GPM	Flow Direction	00
EGU Rate Factor	1	Contact In 1 Functio	00

Table 48. Sample Database Report (Continued)

Parameter	Value	Parameter	Value
Raw Rate Format	06	Contact In 1 Operati	01
Rate Damping	3	Contact In 2 Functio	00
Totalizer On/Off	00	Contact In 2 Operati	00
Rate EGU M2	00	Noise Reduction On	01
Total Rate Units M2	Gal	TON Count (20 mA)	26102
EGU Totals Slope	1	TON Count (4 mA)	5113
Tot/Net Format	04	Meter Factor Use	12.19999
Grand Total Format	04	Cal Date	01/25/00
Output Mode	01	Cal Name	JB
Digital Mode	01	mA Hold Value	0
Analog Mode	00	Pulse Hold	0
Upper Range Limit #1	200	Kernal Major Revisio	00
Upper Range Limit #2	25	Kernal Minor Revisio	00
Upper Range Limit #3	5	SREVMAJ	00
Pulse Output Mode	00	SREVMIN	00
Pulse Out URV	100	Display Major Revisi	00
Rate Max Freq	02	Display Minor Revisi	00
Tot Max Freq	00	Parameter Table Offs	00 00
Rate Out Damp	1.1	Parameter Table CRC	3e 5a
Relay 1 Function	00	Parameter Table Type	49
Relay 1 Alarm	01	Parameter Table Size	45 56
Relay 1 Operation	01	Reserved	49 4e 47
Relay 1 Suppression	00	REV_INFO	c0
Relay 2 Function	00	UNUSED	1/25/00
Relay 2 Alarm	01	Sensor Minor Revisio	03
Relay 2 Operation	01	Sensor Major Revisio	01
Relay 2 Suppression	00	UNUSED	49649
Alarms On	00	UNUSED	49649
High Alarm On	00	UNUSED	11
High Alarm Set Point	200	M1 Offset	0
High Alarm Deadband	10	Subtype	01
Low Alarm On	00	Database Change Count	ce
Low Alarm Set Point	0		
Low Alarm Deadband O	0		
Tot 1 Alarm On	00		

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